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ABSTRACT

This collection of teaching units is one of three volumes designed to assist teachers in bringing relevant, interdisciplinary, environmental learning experiences to elementary students. This first volume is aimed at the K-2 level and deals with the immediate environment of the student. Titles of the nine units presented are: Preparing for Seasonal Change: Fall; The Terrarium; Food Chains; Food Web; Birds in Our Lives; Trees; Trash; Dirt and Stuff; and Kittens. For each unit, objectives are specified, a series of learning activities is described, and appendixes giving teacher background information and listing references (including books and periodicals, films, transparencies, duplicatng masters, picture sets, pamphlets, and records) are provided. (DT)

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Environmental Learning Experiences for Kindergarten through Second Grade

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SE 017 960

Ohio Department
of Education
Columbus, Ohio
1973

Prepared by
Center for the Development
of Environmental Curriculum
Willoughby-Eastlake City Schools
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The continuing thrust toward environmental awareness has brought increasing realization that environment encompasses the totality of man's surroundings, both living and non-living, natural and man-made. Environmental concerns should not be separated from other areas of knowledge.

Increasingly, the need has been felt for teaching materials which would assist educators to infuse environmental concepts into existing curricula in a meaningful way. Environmental education should be a part of learning at all grade levels.

In response to this need, the Ohio Department of Education has developed a series of publications to assist schools in implementing an interdisciplinary approach to environmental education. The publications encompass a resource catalog; guides to distinct Ohio environmental study areas; a series of experience units; and a planning guide for outdoor education.

A Center for the Development of Environmental Curriculum was established in August, 1971, in the Willoughby-Eastlake City School District under an ESEA Title III grant administered through the Department of Education. The units in this volume were generated from materials developed by the Center and pilot tested in sixteen elementary schools in Ohio.

This collection of units is one of three volumes designed to assist teachers in bringing relevant, interdisciplinary environmental learning experiences to Ohio elementary students.

Martin W. Essex

Martin W. Essex
Superintendent of Public Instruction

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Introduction

In order to provide a basis for construction of these units, the Center for Development of Environmental Curriculum analyzed several new curriculum programs in environmental education and science. One, the National Environmental Education Development program, was responsible for developing the strand approach to education. This approach is a strategy of looking at the world that ties the various fragments (like mathematics, music, history, and biology) into an understandable whole. Through the strands — patterns, adaptation, change, interdependence, and diversity, or PACID — a child begins to see that the world really is an indivisible fabric of matter and energy into which he himself is firmly stitched.

Man and His Environment, a National Education Association publication (Washington, D.C., 1970), provides the following definitions of the PACID strands:

> Patterns: Organizational patterns are kinds of structures that may be found in rock formations as well as in social groups of people and animals. Functional patterns include traffic movement and classroom schedules. Spatial arrangements are patterns that often please us. Such patterns occur both in nature and in artistic design.
>
> Adaptation: Over extensive periods of time, a great number of changes come about in order to enable an organism to adapt to the environment. Hereditary factors then preserve the continuing elements. The characteristics that enable the organism to adapt best are apt to be the traits passed on from generation to generation, thus ensuring survival of the species.
>
> Change: Living and non-living things are constantly changing, whether among galaxies and planets or within body cells and body systems. Some things remain the same in spite of change. Matter and energy may change in form, but they can never be created or destroyed.
>
> Interdependence: Nothing exists in isolation. Each individual is constantly interacting with living and non-living things: his family, his belongings, his friends and his world. These people and things also depend on the individual in order to function properly. The process is continuous as part of the life cycle even after death, for dead life forms nourish the living.
>
> Diversity: Many likenesses and differences occur among living and non-living things. A variety of functions, sizes, and structures exist in plants and stars, rocks and animals, processes and people. Yet there are sufficient similarities to permit their classification into orderly patterns. These classifications increase one's understanding of his world.

PACID, then, provides the conceptual orientation for these units. These principles form a basis for identifying, organizing, and studying the workings of the world as they manifest themselves in any body of knowledge.

Since environmental education impinges on every aspect of living and learning, these units are not intended to be taught as a separate subject, but to be integrated into the existing curriculum. Also, their arrangement in these pages implies no pre-ordered sequence in which they should be presented, though certain units have been placed before others because they present concepts basic to further understanding (for instance, Food Chains precedes Food Web).

For an environmental program to be successful, objectives must be identified in order to direct the experience toward the desired outcome. The Center for Development of Environmental Curriculum has identified the following objectives of an environmental curriculum for kindergarten through grade six:

- Critical thinking skills
- Problem identification and solution skills
- Knowledge of the biophysical and socio-cultural concepts
- Decision making
- Value and value formation
- Definition of priorities
- Personal environmental philosophy
- Avenues for maintaining or changing the environment

For a program to be effective, it must also have an organizational strategy. The direction in these units is from a heavy emphasis on affective experiences in the early grades to development of skills and content in grades five and six. In order to relate the curriculum to the conceptual development of the student, the environmental units consider progressively larger and more complicated environments.

The first level, from kindergarten through second grade, deals with the immediate environment. This is the environment that a student can directly experience in his immediate vicinity, on his level, one concept at a time: one tree, one kitten, one terrarium.

The units for grades three and four are concerned with the local environment, which includes what the student can directly experience by moving from one location to another: from the classroom to the cafeteria; the school building to the school yard; the forest to the meadow. Students consider both individuals within the community as well as community organization.

The third level includes grades five and six, and deals with the community environment. This environment may be a woodlot, a pond, a city block, a town, or a city. Students directly experience portions of the material, but they also have vicarious experiences through audio-visual materials or readings. Emphasis on socio-cultural and biophysical concepts increases. The skills of problem solving and critical thinking receive additional attention at this level.

Preparing for Seasonal Change: Fall

The fall activities at the beginning of the school year can set the environmental tone for the whole year.

Use these activities as interest grabbers, introductions, or supplements to your regular units on fall and other seasonal changes. Although only one of the concepts of patterns, adaptation, change, interrelationships, or diversity may be emphasized in the objectives, all of the concepts can be looked for.

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PREPARING FOR SEASONAL CHANGE : FALL

Unit Objectives:
Children will be able to explain the ways some living things are adapted to seasonal change in the fall.

Environmental Experience 1: Bear Hunt
Read a story about fall and encourage the children to look for signs of fall on their way home. For more advanced students, discuss the life cycle of moths and butterflies and how they overwinter. Tell the students that they are going to go outside and hunt for bears, that is, the Woolly Bear. This black- and rust-colored caterpillar will later emerge from its cocoon as an Isabella moth.

Distribute among the class some small containers for putting their catches in. Assign one unbreakable container to a student who will be in charge of it for the whole outdoor experience. Plastic bottles and boxes or any other small, not-too-fragile container will do. Have a receiving cage ready for the bears, back in the classroom. A wide mouth mayonnaise jar with a lid will do, or a plastic storage box will also work. Be sure the container has adequate openings for air. Collect one bear per group. Practice good conservation by leaving most of the bears where they are found.

During fall, the woolly bear caterpillars are on the move. Most children know and love this harmless moth-to-be. If you announce the bear hunt several days prior to the experience, the class will be buzzing with excitement. Go outside and collect the bears and bring them back to class. If more than one bear is found, compare them. Are the stripes the same width? Are they the same color? Is one bear bigger than another? Several of the children will probably be more adept at finding and handling the bears, so they could naturally act as resource people to help the class in their hunt. Search the edge of the school grounds where the grass is a little taller. If you have adult help, divide the class in half. When someone finds a bear, let the whole class share the discovery.

When you return to the classroom, put your catch into the containers along with various lawn grasses and weeds. Woolly bears feed on grasses and garden plants in the fall, hibernate as larvae in cocoons over the winter, and transform (pupate) into small moths in the spring. Please don't keep the bears indoors too long. The cocoons should be placed outside the window for the winter so that the heat of the room doesn't cause them to transform too early, or to dry out.

When spring arrives, bring the cocoons back in and wait for transformation. As you search the school grounds and borders for bears, many other insects will be found and caught. Keep these in class for a few days, and then turn them loose. **Warning:** Since children can get carried away, try to control the number of insects brought in and kept.

Additional Activities
- ☐ Present a dramatic skit about the big bear hunt for other classes.
- ☐ Try to predict the severity of the winter by seeing how wide the black bands on the bear are. The wider the black bands, the harder the winter, so they say. Discuss other aspects of folklore and weather (see appendix).
- ☐ Compare the differences in bears with the ways children are different.
- ☐ Move like a woolly bear, a butterfly, a caterpillar.
- ☐ Bring in a tomato worm, and watch it eat.
- ☐ Do a unit on insects.
- ☐ Develop a chart of changes by animals, plants, and people in preparation for winter.
- ☐ Look for other animals preparing for fall.
- ☐ Look for people preparing for winter.
- ☐ Integrate this unit into your fall unit.
- ☐ Observe changing shadows. Take children outside, and record shadows on large sheets of brown paper during the fall. If you have a good shadow wall in your classroom, observe the changes throughout the school year.
- ☐ Introduce weather and keep a daily weather chart. Observe cloud shapes. Talk about how bad weather affects living things.

Materials
Containers
Small and large vegetation

Environmental Experience 2: The Gentle Migration
Discuss with the class the idea of how some animals go south in winter to keep warm and find food. Show a film or filmstrip on bird migration. Explain to the class that other migrations also occur, and that we can see them right on the school ground or even in our own backyards. Read a story about butterflies to the class.

During the month of September, great numbers of monarch butterflies move south and southwest across Ohio. You and your class can observe this spectacular migration. Prepare your class for an outdoor experience by talking about monarchs and showing a film or filmstrip on their life history.

Due to the unpredictability of finding monarchs on any one day, this unit will almost have to be spontaneous. On special September days, monarchs migrate in what appears to be aimless fluttering. On a bright, clear mid-September day, take the class outdoors and seat them in a large circle. Choose a place on the school ground with the best 360° view of the sky and horizon. Because the class is seated in a circle, they will have the opportunity to view all directions at once. The monarchs may be flying high or low, so the children will have to be very observant. When a monarch is sighted, the child should shout "monarch," and point to it so the rest of the class can see it. Keep track of the number of monarchs spotted and calculate the number that may pass in a day, a week, or two weeks. Perhaps a second watch a week later would be good to compare numbers seen.

Additional Activities
- ☐ Find out if there are any butterfly trees in the area and try to plan an after-school trip to see them. A butterfly tree is one that many monarchs may roost on to spend the night. Some of these trees are very

famous and may have 10-20,000 butterflies on them.

- ☐ Collect or order cocoons and keep them outdoors until spring. (See appendix.)
- ☐ Watch for other migrants: birds, dragonflies, and other butterflies.
- ☐ Do a unit on migration of birds and other animals.
- ☐ Discuss and discover the differences between butterflies and moths.
- ☐ Keep a record on the calendar to see how long the migration lasts. Note also if the butterflies fly on cloudy or sunny days. Why?

Environmental Experience 3: Rosette

Discuss with the children how some plants prepare for fall. Some trees lose their leaves, other plants die down and their roots live until the following spring. Some plants, like pine trees, stay green all winter. A few plants have leaf patterns called rosettes that stay green during the winter. Rosettes are circular clusters of leaves that are on the surface of the ground. Go out and find a dandelion and you will have a good example. Queen Anne's lace, mullein, thistle, dandelion, and yarrow are a few of the plants that form rosettes for the winter. If you need help identifying the plants, ask a gardener or farmer.

Plan an outdoor experience to find rosettes, so that they can be dug up and brought indoors for winter evergreens. They should stay green and may even grow indoors. Look around the school site and find a small rosette. Show the children how to transplant the rosette and its long tap root into a pot. As soon as you have enough rosettes to satisfy your needs, take them inside, plant them in clay pots, and set them on a sunny window sill. Discuss with the children the care that the plants need, and also encourage them to watch for changes in the plant now that the plants are indoors where the weather is different. Make frequent trips outdoors to compare the indoor plant with the wild plants. In the spring, make frequent trips outside and eventually plant the rosettes where they can be observed.

Materials

Small shovel or trowel
Clay pots

Environmental Experience 4: Seeds

Read a story about fall and discuss it with the children. Tell the children that they are going for a walk to look for signs of fall. List some things to look for on the board. Take along a gunny sack and have children take turns dragging it through the weedy areas. A fun alternative approach is to make a vest out of the sack and have the children roll around in the weeds. Take the sack back to the classroom and remove the seeds that are stuck. Don't forget the resources (seeds) are being carried on the children's gunny sacks. Notice the shapes, colors and types of stickers.

Additional Activities

- ☐ Discuss other ways seeds travel and bring in examples.
- ☐ Find pine seeds (in the cones).
- ☐ Make a seed collection.
- ☐ Do seed coliages.
- ☐ Run with milk weed stalks to watch the seeds disperse.
- ☐ Throw maple seeds in the air.
- ☐ Dry bean pods to see what happens.
- ☐ Look for seeds in fruit.
- ☐ Do nutty things.
- ☐ Germinate seeds.

Materials

Gunny sack
Small containers

Appendix

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Darby, Gene. *What Is a Season?* Westchester: Benefic Press, 1960.

Friskey, Margaret. *Johnny and the Monarch.* Chicago: Children's Press, 1946.

Gates, Richard. *True Book of Conservation.* Chicago: Children's Press, 1959.

May, Charles P. *When Animals Change Clothes.* New York: Young Readers' Press, Inc., 1965.

Podendorf, Illo. *The True Book of Seasons.* Chicago: Children's Press, 1955.

Politi, Leo. *The Butterflies Come.* New York: Scribner, 1957.

Selsam, Millicent. *How Animals Sleep.* New York: Scholastic Book Services, 1953.

Films

Animals in Autumn, 11 min., B/W, color, Encyclopedia Britannica Educational Corp., 425 N. Michigan Ave., Chicago, Illinois 60611.

Children in Autumn, 12 min., B/W, Color.

Farm Family in Autumn, 14 min., B/W, Color.

Monarch Butterfly Story, 11 min., Color.

Autumn Comes to the City, 11 min., B/W, Color, Coronet Films, Coronet Building, 65 E. South Water St., Chicago, Illinois 60601.

Film Strips

Autumn Is Here, 27 frames, Color. Society for Visual Education, Inc., 1345 Diversey Parkway, Chicago, Illinois 60614.

The Caterpillar's Journey, 29 frames, Color.

Fall Adventures, 38 frames, Color.

How to Identify Moths and Butterflies, 32 frames, Color.

Life Cycle of a Monarch Butterfly, 25 frames, Color.

Migration of Birds, 47 frames, Color.

The Seasons, 27 frames, Color. (set of 4).

When Autumn Comes, 24 frames, 3½ min., Color.

Transparencies and Duplicating Masters

Seasons and Living Things, Millward Teaching Aids, P.O. Box 25, 14 Roberts Road, Wellesley Hills, Mass. 02181.

Plants and Animals

Picture Sets

Moths and Butterflies, 8 pictures, Color SP 107, Society for Visual Education, Inc., 1345 Diversey Parkway, Chicago, Illinois 60614.

The Life Cycle of the Monarch, A sequence chart, The Child's World, Inc., Mankato, Minn. 56001.

Other Useful Materials

Moth Cocoons — General Biological Supply House
4¢ each 8200 South Hoyne Ave.
Chicago, Illinois

Magnifying Glass

Binoculars

Pamphlets

Seeds and How They Travel, Audubon Nature Bulletin, National Audubon Society, 950 — 3rd Avenue, New York, N. Y. 10002.

Winter Sleep — How Wildlife Survives Winter

Track Stories in Mud, Sand & Snow

The Terrarium

Terrariums have brought joy to people for about one hundred years, ever since Dr. Ward, of England, noted that plants kept growing under tightly sealed glass.

It is easy to teach the interdependence of plants and animals when there is a terrarium in the classroom. Children come to realize, by observing this closed environment, that things constantly change.

Constructing and observing a terrarium will stimulate their interest in investigating the world of living things.

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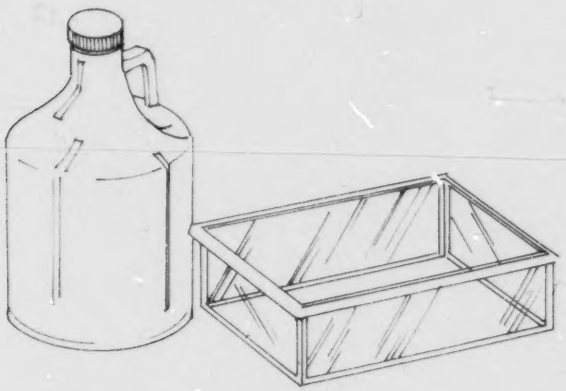
THE TERRARIUM

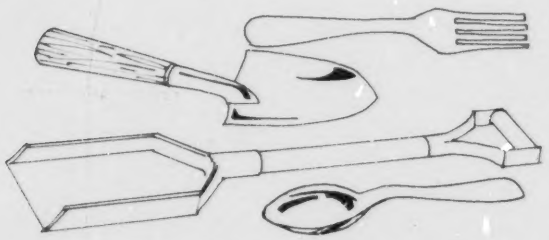
Unit Objectives:
The students will be able to:
1. construct a simple terrarium.
2. describe patterns and shapes.
3. describe changes that are taking place in the terrarium.
4. express their ideas of how the plants and animals in their terrarium need each other.

Environmental Experience 1: Building the Terrarium

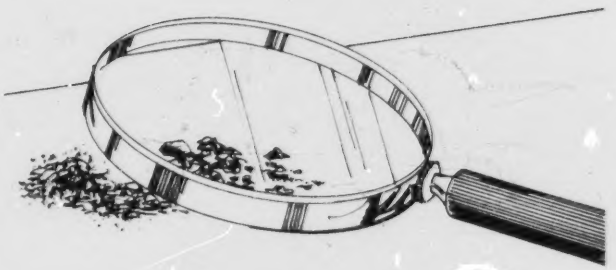
1. Obtain a suitable container for a terrarium: aquarium, mayonnaise jars, clear glass jugs, or any other *transparent* container. List with the children the various components of a terrarium and discuss where these materials might be found on the school grounds.



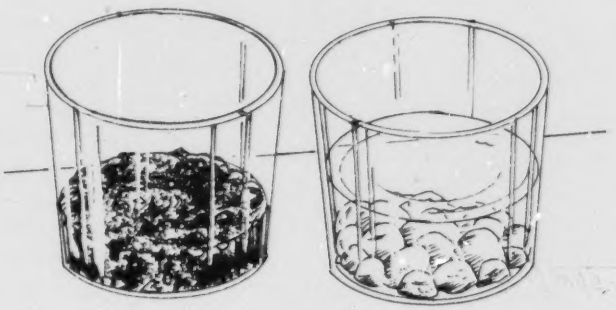
2. Take a short trip out-of-doors with the class to gather the materials needed. Bring various digging tools and containers.



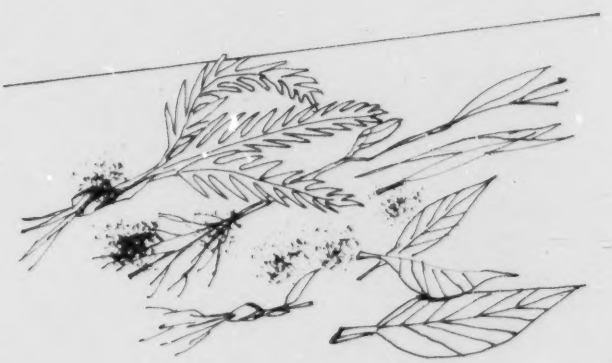
3. Return to the classroom and deposit the collected materials on a table. Discuss the various components of the terrarium and let the children examine the materials with a magnifying glass if possible.



4. Put some gravel into a container and soil into another and pour a little water into each. Discuss how the soil soaks up water and how the rocks do not. Discuss what might happen if too much water is put into the soil of the terrarium.

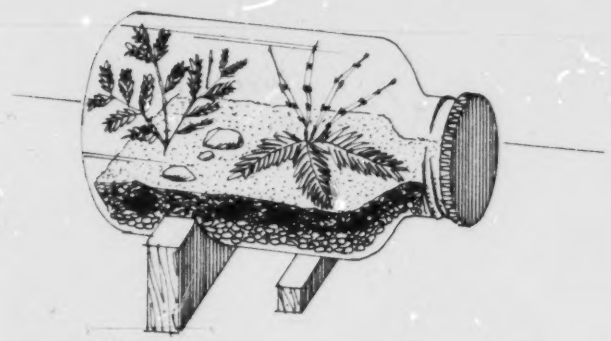


5. Discuss the plants you have collected, pointing out roots, young shoots, leaves, and other parts. Ask the children to talk about plants and how they are used.



6. If you have collected a rock, discuss why the rock will be put into the terrarium. What might hide under the rock, sit on the rock, grow on the rock?
7. If you have animals, talk about how they are alike and different. What do they eat? What might happen to them in the terrarium?
8. Discuss with the children the "mini" world of the terrarium; how the plant and animal inhabitants after their death decay and enrich the soil with organic matter.

9. Construct the terrarium



Additional Activities

- ☐ Ditto directions and illustrations to be taken home, and urge the children to teach their parents and/or friends how to build a terrarium.
- ☐ Have the children enter or display their terrariums in a local flower show, or garden club contest, or conduct your own contest including ribbons for prizes. (No losers, please.)
- ☐ Evaluate the health and function of the classroom terrarium. Could there possibly be an imbalance to cause the terrarium to function improperly? What could be done to the terrarium in order to perfect the balance so requisite for its continuous operation?
- ☐ If the mini-world is not surviving, have the children check the following conditions:
  - balance between living organisms and non-living materials
  - type and age of plants and/or animals
  - health of plants and/or animals
  - balance between plants and animals
  - cover or seal
  - location in the classroom
- ☐ Have them make changes to improve their terrarium
- ☐ Make a jig-saw puzzle.
  - Print the names and/or draw pictures of all the materials needed to make a terrarium on a sheet of oak tag board. See appendix.

Environmental Experience 2: Patterns in the Terrarium

Every plant, animal, or rock has a definite identifying pattern. Toads have a warty, long-legged, popeyed pattern. Sandstone has a sandy pattern. A pattern may develop in the feeding habits of the animals. Patterns of the terrarium are especially well suited to the development of art lessons. Many famous works of art are inspired by the natural world.

Have the children pretend they are bugs or worms living in the terrarium and draw a bug's-eye view of that world.

The children may look for and enjoy acting out some of the several kinds of patterns they see in the terrarium.

Sample patterns in the terrarium:

Spatial Pattern: snail shapes, plant colors, identifying marks of animals, textures of plants and animals, geometric designs. Organizational Patterns: how plants and animals live together. (Community)

Functional Patterns: when the animals eat, when the rain falls, sequence of flower to seed, reproductive cycles.

Additional Activities

- ☐ Integrate patterns into the art lessons. Look for patterns on the school site and in the classroom. Have the children draw patterns of what they see, feel, and/or learn.
- ☐ Conduct a shape treasure hunt; look for circles, stars, cylinders, spirals, cubes, and cones. Use pictures, a nature display table, the terrarium, and the school site as resources. In your classroom you may want to have a nature table. This would be a special area to display things such as leaves, nuts, cocoons, pine cones, and rocks that you or your students collect.
- ☐ Develop vocabulary by looking for comparative textures and use adjectives as descriptors. Have the children cut out pictures which depict their vocabulary.

rough	soft	metallic	sharp
smooth	gritty	furry	slimy
sticky	oily	scaly	spiny
slippery	powdery	greasy	damp

Environmental Experience 3: Changes in the Terrarium

Over a period of time, many changes occur in the terrarium. Each day the terrarium's physical environment changes; in addition, all of the living things in the terrarium undergo change. Death and decay are the ultimate form of change in the terrarium. The dead

and decomposing animal and plant remains give support for renewed life. The terrarium is a miniature, near-perfect model of the real natural world, and changes in the terrarium can be compared with changes of the natural world.

The children should look for changes and record them. Various tools and instruments may be employed to help observe the changes.

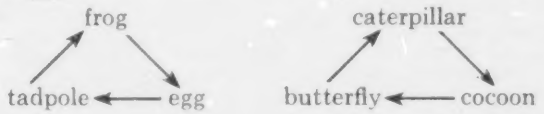
Terrarium Sample Changes

Plants:	Seeds sprouting, seedlings growing, flowers developing, fruits, plants decaying, mold forming
Animals:	Reproducing, dying, moving, shedding skin
Other:	Decaying, evapo-transpiration (the rain), temperature, changes in the rocks

A thermometer and a magnifying glass can help you observe some of the changes of color, plant growth, and others.

Additional Activities

- ☐ A good extension would be to look for parallel changes on the school site, the aquarium, and pictures that represent change.
- ☐ Have the children pretend they are one of the animals living in the classroom terrarium. Write or illustrate an imaginative story about what is changing and happening within this "classroom terrarium" world. Include how the various plants and rocks appear when "eyeball to eyeball" with them.
- ☐ Make insect cycle murals using pictures of animals. Example:



- ☐ Take an exploration walk near the school or a field trip to a wooded area to give the children an opportunity to note patterns and changes and relate them to their classroom terrarium (their mini-world).

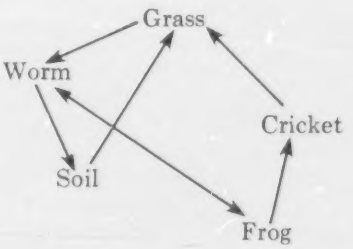
Environmental Experience 4: Interdependence in the Terrarium

All of the plants and animals of the terrarium are dependent upon the sun for their source of energy. The plants trap the energy of the sun and convert it into food which the animals eat. The plants are the producers, the animals that eat the plants are consumers. Animals that eat plant-eating animals are the secondary consumers. When a plant or animal dies, the decomposers recycle the dead organism. Both the producers (plants) and the consumers (animals) need water. The water in the terrarium is in a constant cycle. The soil moisture is taken up by the plants and some of it is transpired (evaporated from the leaf) as a vapor into the atmosphere of the terrarium. When the moist air comes into contact with a cool surface, the vapor condenses and falls as "rain" in the terrarium. This usually happens when the room the terrarium is in is cooler than the terrarium itself.

Have the children observe the terrarium for interdependence of the organisms and the environment. Ask the children to develop their ideas of how the plants and animals need each other. What things do plants need to grow so that they may feed the animals?

Have the children draw pictures and/or write name tags for the contents of the terrarium (air, sunlight, water, soil, plants, animals). Put their pictures on the blackboard and have the children draw arrows connecting the various interrelated living and nonliving contents of the terrarium.

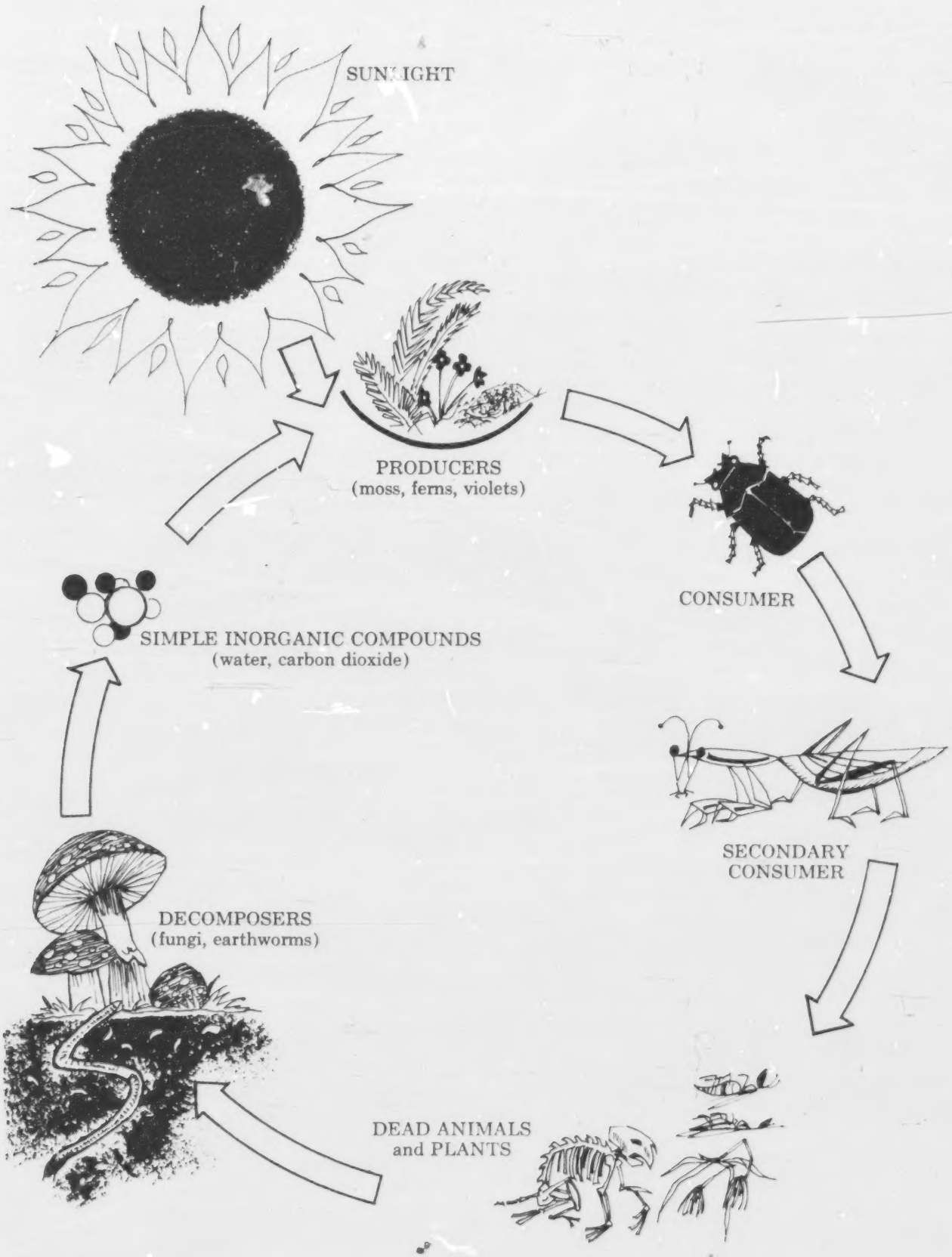
Example:



This is an example of the complex web of life that occurs in the terrarium. The web never begins or ends; it is cyclic. The grass is eaten by the cricket, who then is eaten by the frog. The frog or cricket dies and is recycled by soil organisms such as worms. Worms also recycle the dead grass, which in turn makes soil so that more grass can grow. Have the children make a *food chain* from the inhabitants of the terrarium. Draw a chain on the blackboard and have them place name tags or pictures of the organisms inside the links.

Additional Activities

- ☐ Develop food chains and food webs for the aquarium and the school site. Extend the food chain idea into the school lunch program. Dramatize how the chain is related to the meals the children eat.
- ☐ Incorporate songs and games into your lesson.


SUNLIGHT
PRODUCERS
(moss, ferns, violets)
CONSUMER
SECONDARY
CONSUMER
DEAD ANIMALS
and PLANTS
DECOMPOSERS
(fungi, earthworms)
SIMPLE INORGANIC COMPOUNDS
(water, carbon dioxide)

Appendix

TEACHER BACKGROUND INFORMATION

You and your class can make a terrarium in anything from a baby food jar to an aquarium (even a leaky one). The principles are the same. The materials you need are:

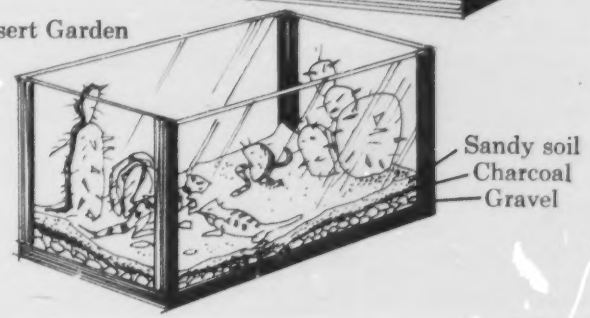
1. A container that light rays can penetrate.
2. Gravel or sand
3. Charcoal
4. Soil with some humus (decayed plant material)
5. Small plants and tree seedlings (Dig up soil with the roots.) Moss, fern, violets are fine. Keep in a plastic bag until ready for use.
6. Small saucer of water
7. A pretty rock or two
8. Plastic wrap or glass to cover the terrarium
9. A few grass seeds
10. A small thermometer to keep in a corner of the terrarium
11. Animals: a snail or slug, bugs, beetles, frog, toad, ant, grasshopper, snake or caterpillars

Putting it together:

1. First, put in a one- to two-inch layer of gravel for the excess water to drain down into.
2. Then add small pieces of charcoal to the soil. Charcoal is burned wood with lots of air spaces and its addition will keep the soil well aerated and will absorb gases. To use commercial charcoal briquets effectively, break them into small pieces to increase aeration. Better yet, if the briquets are burned, the alkalinity or "sweetness" of the soil increases. For greater effectiveness, add burned wood ashes. This will improve both the physical and chemical structure of the soil.
   (An alkaline or "sweet" soil contains more elements of calcium, potassium, and some compounds such as lime. Some plants thrive better in "sweet" rather than in "sour" soil.)
3. Add two to three inches of topsoil. Don't use playground clay, but soil from under bushes, along fences, or in other areas where some humus has accumulated.
4. Add a small water dish to serve as a pond for animals to drink from and to supply a good humid environment.
5. Add the plants. Space the plants to allow room for growth. You may also want the children to plant a *few* seeds or nuts.
6. Add the animals. Do not put large animals in — no mammals. A snake or toad needs room; snails, worms, and ants need less room.
7. Place the terrarium near a window but do not let the sun shine directly on the terrarium or you will have an oven instead of a terrarium. Do not set the terrarium on a radiator or other heat source.

Woodland Garden

Desert Garden



Maintenance:

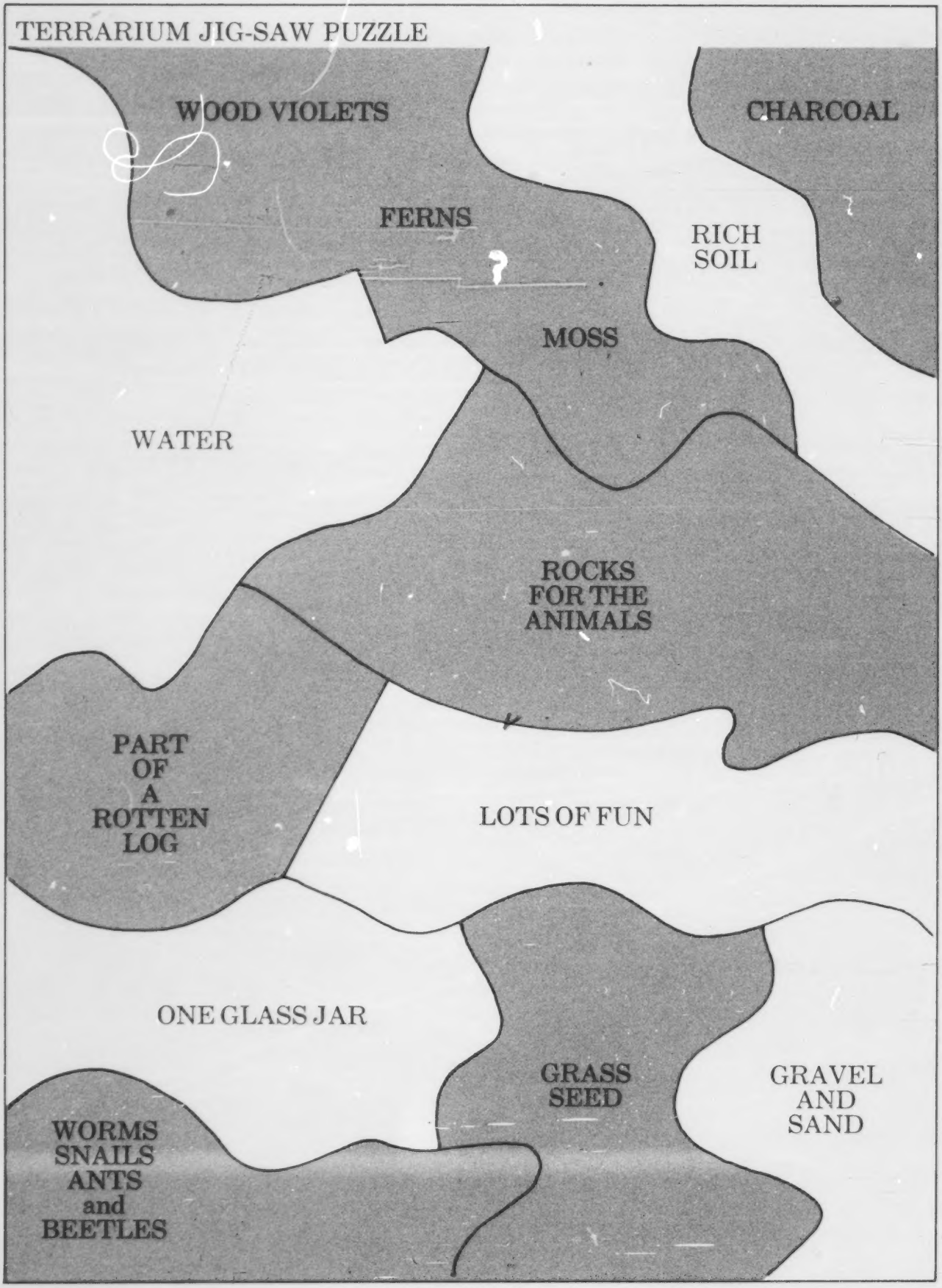
If the terrarium seems dry and a "rain" doesn't fall from the top of the container, sprinkle a little more water in. If mold is forming, it is too wet. Leave the top off for a day, or leave a slight space in the top covering. Dead plants or animals should be left to illustrate the recycling of material.

The children may respond to a request with more animals than the terrarium can handle. Keep the number and size of the animals limited. Too many slugs can defoliate your terrarium and a medium-sized turtle can trample it. You may have to be selective.

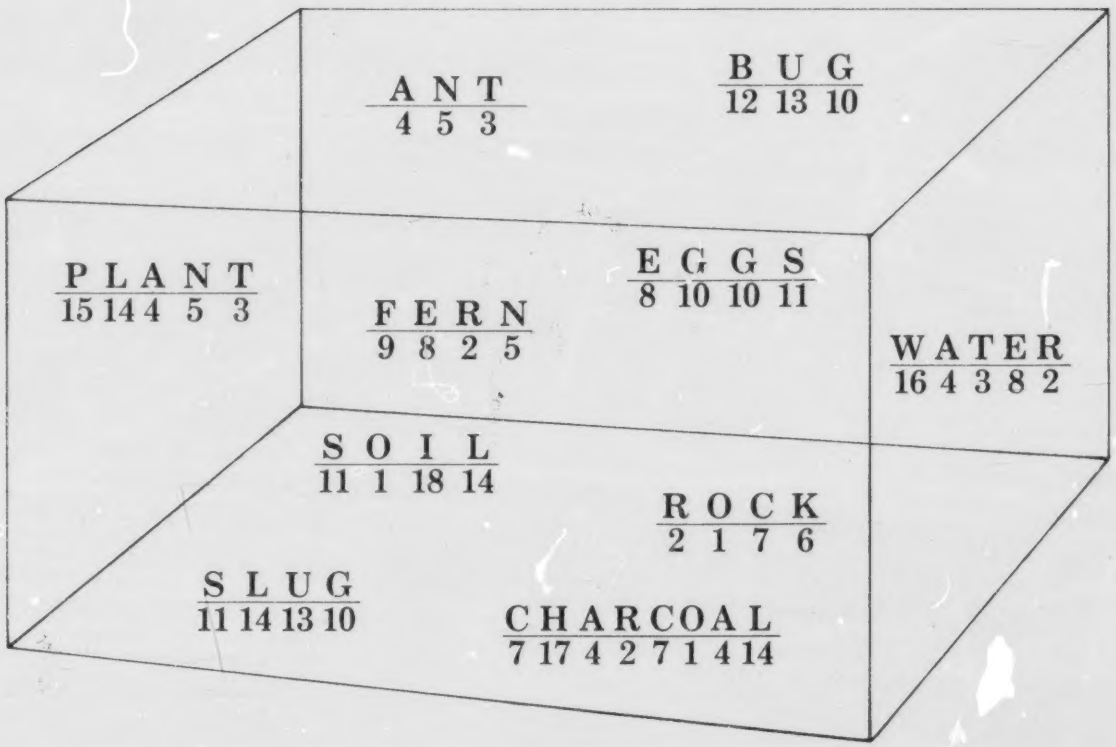
The terrarium can self-support a limited supply of plant-eating animals, and probably only one meat-eating animal. For instance, several grasshoppers will eat the plants and, in turn, be the food for a single toad.

The purpose of limiting the supply of animals to a closed terrarium is to demonstrate how soil, plants and animals, *thriving within the confines* of the container, depend upon the life and death of each other. The terrarium plants and animals may exist totally independent of any outside forces. This is representative of a closed system. The mini-world in your terrarium is self-supporting.

If you have more animals than the terrarium can hold, you will have to supplement their food. Soft fruit and leafy material for those that eat plants and live worms and insects for the meat eaters will be necessary. A reminder: To use supplemented foods in the terrarium alters the relationships among the soil, plants, and animals. This kind of terrarium would demonstrate a less "closed" system.


TERRARIUM JIG-SAW PUZZLE
WOOD VIOLETS
CHARCOAL
FERNS
RICH SOIL
MOSS
WATER
ROCKS FOR THE ANIMALS
PART OF A ROTTEN LOG
LOTS OF FUN
ONE GLASS JAR
GRASS SEED
GRAVEL AND SAND
WORMS SNAILS ANTS and BEETLES

PUZZLE: WHAT'S IN THE TERRARIUM?*
Have the students fill in the numbered blanks with the corresponding letter. Use the names of plants and animals the class will find in their terrarium.



R A F E N O G U P H C S W B T K L I
2 4 9 8 5 1 10 13 15 17 7 11 16 12 3 6 14 18

*Janet Gilchrist, teacher at Glenbrook Elementary School, 23500 Glenbrook Boulevard, Euclid, Ohio 44117

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Food Chains

Learning about food can be deadly dull to a child. A unit on the food chain gives the teacher a logical reason for bringing nature into the classroom, and for taking the classroom out to nature if so desired.

By tracing the sources of their favorite foods, the children can come to realize that people depend on each other in a cooperative world. They will come to know that plants, animals, and the soil are equally important to their well-being.

By working with the food chain, a child should develop a positive, constructive attitude toward himself and the world around him.

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FOOD CHAINS

Unit Objectives:
The children will be able to describe and illustrate:
1. the interrelationships of a food chain.
2. an awareness that all life forms depend upon each other.

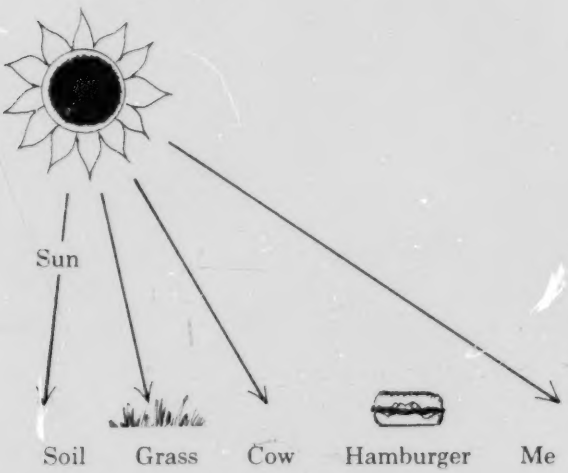
Environmental Experience 1: Where Lunch Comes From
Have the children cut from magazines, or draw, pictures of food they eat for lunch.

On the blackboard, place a picture list of a lunch menu for one day.

Have the children connect with twine pictures of their favorite food to a picture of its source. As each food product is traced back to its source, link the names together. The children will be able to see a chain form.

Everything is linked together; the milk we drink, our meat, even fish, are dependent upon the land. Ultimately, all food comes from the soil and the sun.

For example, the hamburger is traced to the cow, the cow to the grass in the farmer's field, and the grass to the soil and the sunlight.



Additional Activities

☐ Have the children develop a rhyme about food chains similar to "This is the House That Jack Built." Remind them of what earthworms do for the soil.

This is the worm,
That feeds in the soil,
That grows the grass,
That feeds the cow
That gives the milk
That feeds the boy.

This is the lunchroom
In a school.
This is the boy that ate
In the lunchroom in
A school . . .

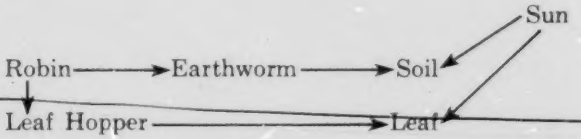
Worms
Long, thin,
Wiggly, squirmy, creepy,
Crawling through the soil
Through the deep, dark soil.

☐ Have them think up other rhymes and/or cinquains about food chains.

☐ Create a detective food chain game for a school yard, an aquarium, a city or whatever local environment they understand.

Examples:

☐ cow — grass — milk — beef — hide —
pig — corn — meat — fat — hide —
fowl — grain — grass — gravel — feathers —
eggs — meat —



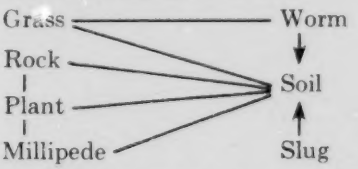
☐ Have a popcorn party—grow your own. Popcorn is a variety of corn. When planted two to three inches deep in good soil, it will grow just as field or sweet corn. Two or three plants would yield sufficient ears of corn.

☐ Record how this plant links to other animals and plants in a food chain.

☐ Use song games to dramatize food chains. For example, to the tune of "Farmer in the Dell," you could substitute "Farmer plows—," "Farmer plants—," "harvests the corn," "family eats the corn," and so on.

☐ Take a field trip to a supermarket and/or a farm. Relate their visit with the environmental experiences.

Environmental Experience 2: Food Chains in the Terrarium
Observe the components of the terrarium and discuss their possible relationships to each other. The children could illustrate the components of a terrarium. Paste these pictures on a chart. Punch a hole near each picture; then connect with yarn or string the relationships in the terrarium.



The food chain of a decayed plant, earthworm, or frog may exist in the terrarium. Perhaps part of the food chain may be missing.

Additional Activities

☐ Ask the children to chart the food chains in an aquarium. Suggest they construct a miniature diorama.

☐ Write and/or read creative stories/poems/cinquain about animals and plants.

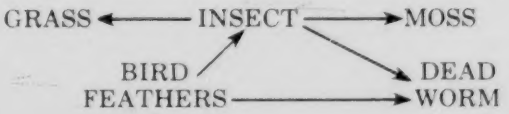
Environmental Experience 3: Food Chains on the School Site
Explore the school site looking for plants and animals that form links in the school site food chain. Make observations: look for pigeons, other birds, worms, pill bugs, insects, squirrels, cats, reptiles, toads, trees, roots,

berry bushes, moss, weeds, and grasses. Include observations such as a robin eating a worm, a sparrow eating from a bird feeder, or anything that can easily be related to a food chain.

Hunt for clues: look for feathers, fur, chewed seeds, nuts, bones, insect shells, egg cases, cocoons, tracks, remains, and/or droppings.

Return to the classroom with your observations and clues. If the class finds any clues that are portable, include them in a classroom display.

Make a card for each item, whether an observation or clue. Each animal, plant, or some part of both, relates in some way to another. Each card represents one link in the specific relation known as a food chain. To assemble the "school site food chain," connect each link with twine.



Additional Activities

- ☐ Develop an art lesson from the ideas you found at the school site. Have the children draw, paint, or make a collage from the material you found at the school site.
- ☐ Make a food chain bulletin board.

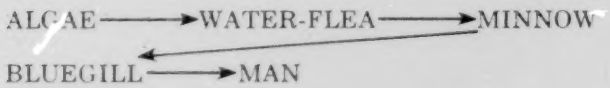
Appendix

TEACHER BACKGROUND INFORMATION

A pond is teaming with life and is a dynamic system.

Look among the strands of algae where water-fleas are thriving upon the rich green plant life. The water fleas are hunted by minnows, which in turn are eaten by bluegills. The bluegills are then eaten by the fisherman, who fishes for his meal.

This network of eating and being eaten is nature's diet *(the food chain)*.



If a fisherman eats a bluegill, it is easy to see how the fisherman needs the bluegill. But what about the bluegill? Wouldn't it be a lot better off without the man? You might think so.

What would happen if the fisherman should vanish? Certainly, fewer bluegills would be caught for food, and what then? The number of bluegills could increase, and in time they would eat all the minnows in the pond. With no food the bluegills would soon die.

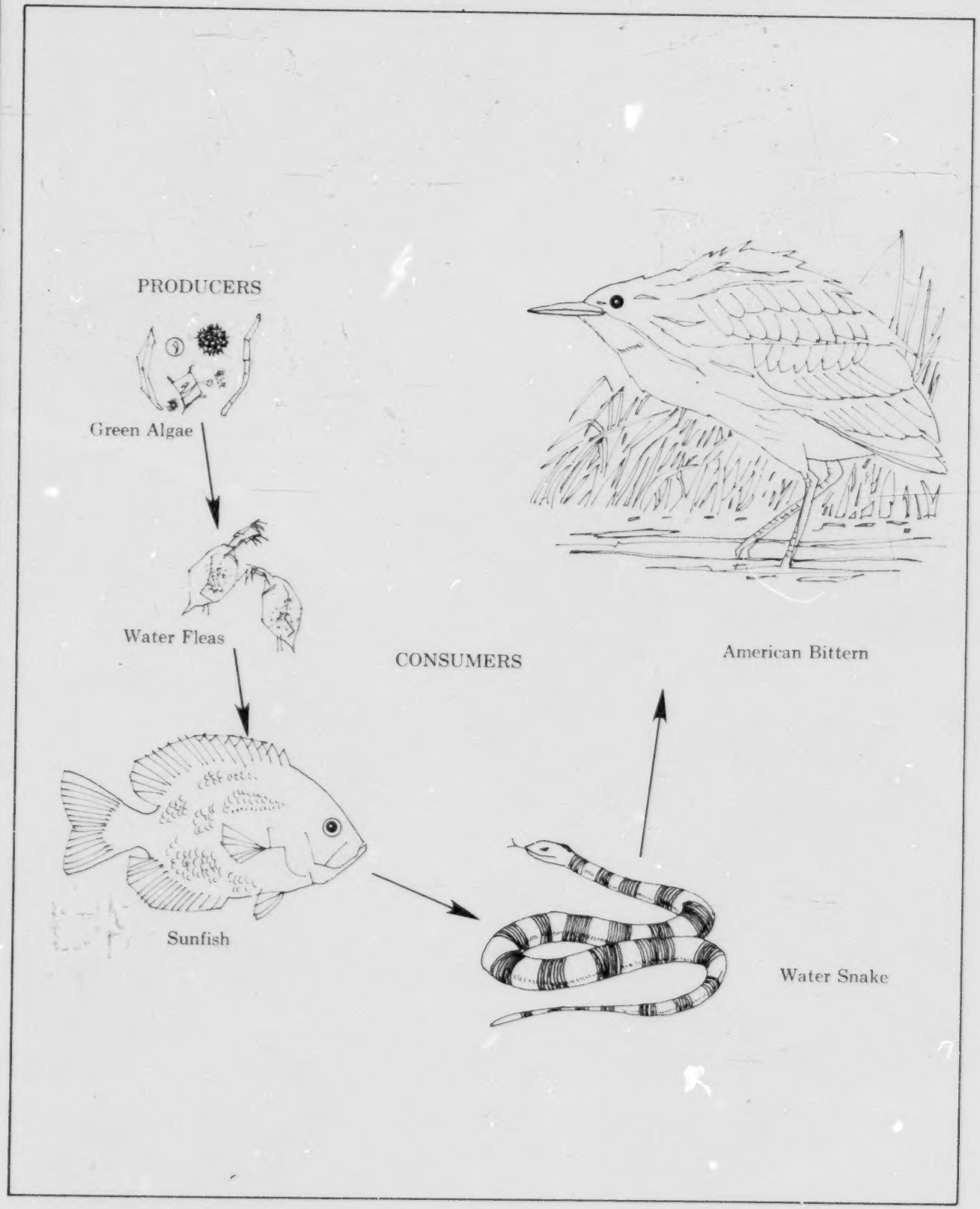
What now happens to the relations between the minnows and water-fleas? The water-fleas and algae?

This additional idea, that animals need each other, doesn't mean that one bluegill needs the man who is fishing for it. It means that any plant or animal *population* cannot go on getting bigger and bigger. Sooner or later, the food chain will be disrupted; the animals and plants in the pond will run out of food and living space, eventually destroying themselves and their habitat.

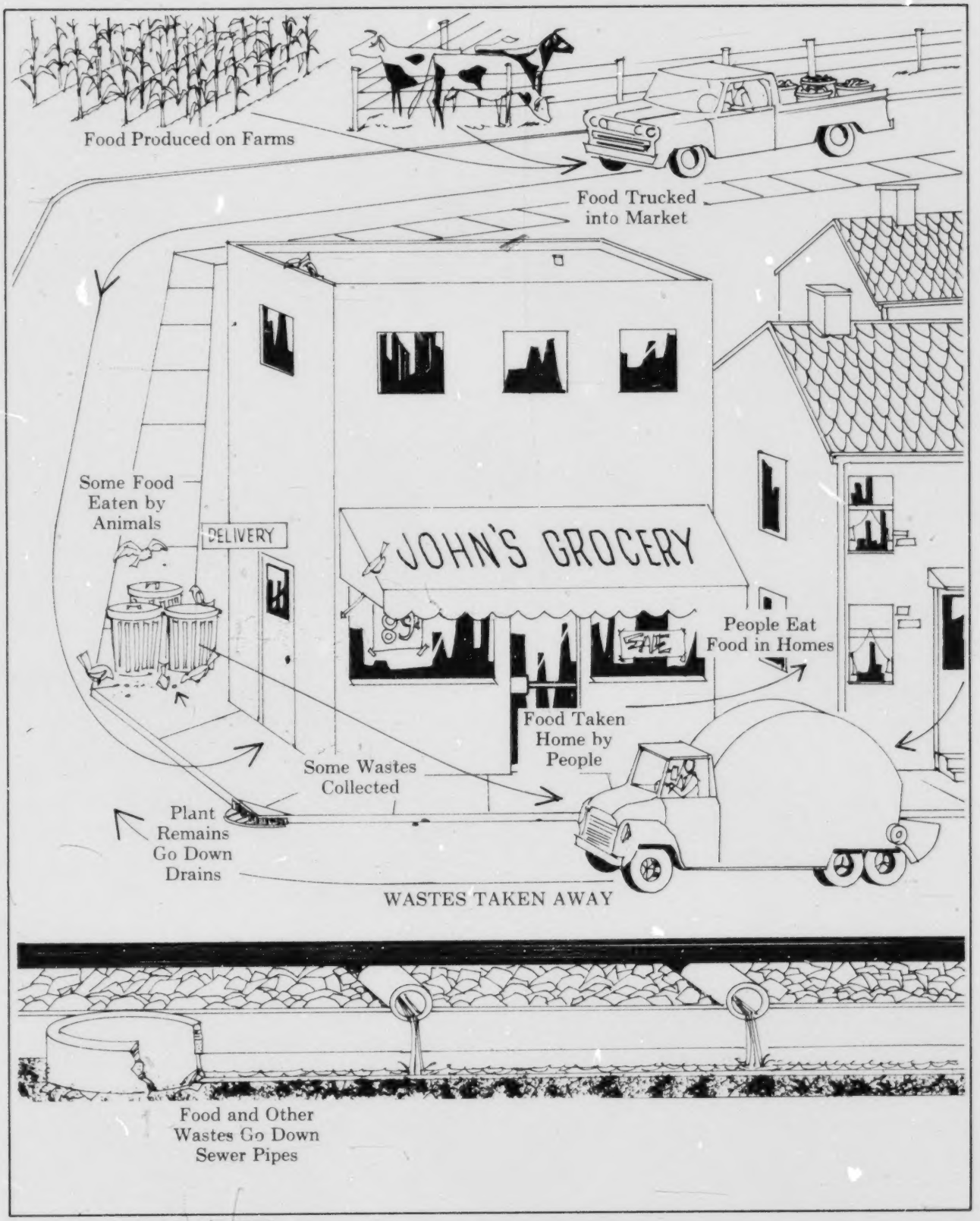
The food chain implies simplicity where complexity exists. For example, algae may be eaten by both tadpoles and water-fleas; a tadpole, when it develops into an adult frog, eats bugs.

In another example, the decaying remains of plants and animals provide food for pill bugs, newly-hatched mayflies, and some snails.

ONE POND FOOD CHAIN



FOOD CHAIN IN THE CITY



GLOSSARY

Balance of nature
The relationship of the different species in a food chain is such that the numbers of each species are kept fairly constant and don't increase to such an extent as to deplete its food source.

Environment
The place where an animal or plant lives. The complete total of all external conditions which may influence a plant or animal.

Food chain
A naturally occurring network of living animals and plants eating and being eaten.

Food web
A combination of food chains.

Interdependence
The need of two or more animals or plants for each other in order for both to survive.

Link
A member of a food chain.

Organism
A living plant or animal.

Predator
An animal that hunts and eats other animals.

Prey
An animal captured and eaten by another animal.

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Food Web

Man, whether he is aware of his role or not, is a member of a scheme that includes all living forms. Each influences the well-being of others. Our contemporary standards of living often remove man from the consequences of his endeavors.

This unit presents the general scheme of the combinations of relationships and changes among all life forms. Teaching a unit on the food web further develops the food chain concept that every living form is functioning in relation to others.

The unit is a convenient motivational vehicle to help a child appreciate the relationships of plants and animals to their environments. In studying one relationship, the child will become aware of the need to understand the other relationships which are involved.

Please note: Start your terrarium soon enough so the animals and plants in this "mini-world" are ready for lesson time.

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FOOD WEB

Unit Objectives

The children will be able to experience and describe:

1. the interdependence of all living things.
2. the interrelationships of food chains and food webs.

Environmental Experience 1: Drama of a Food Web

This activity is to introduce to the children the idea that every plant, animal, person, even the smallest raindrop is important. One reason all life forms are important is that they depend on each other for food. The ecologists call this relationship a food chain, and the combination of these chains, a food web. Each plant, animal, and even inorganic material (air, water, minerals, sunlight) is one link in these chains. In a food web, the link that often appears to be of least importance is as essential as the more obvious link. (See the Teacher Background for further explanation.)

Read to the class a story about the life adventures of one of their favorite animals. Have them listen with the intention that they will dramatize the story. A picture list of animals, plants, and places on the blackboard may clarify the story line.

Plan ahead to have the children design props from recyclable materials. (See the Appendix for stories appropriate for this experience.)

Give each child a name tag or imaginative prop to represent his part. "Lights, Camera, Action — A Food Web Revue!"

Additional Activities

☐ Encourage the class to display on the bulletin board the food web from the story read for this Environmental Experience. Note: As you read it, list the characters on the bulletin board. Have the class follow the plot and show the relationships among the plants, animals, and inorganic materials. Use twine, yarn, or arrows to connect the members of the food web when they are consumed, used and/or later decomposed.

Environmental Experience 2: Stage a Scene

On the blackboard, post a chart of the food web. Assign the children to be members (the plants and animals) of the food web. Have each draw his assigned animal or plant on a card and attach a string to it to hang around his neck.

With a ball of twine, build the food web from the center out. Let each child hold a piece of twine in his right hand, the end of which leads to the child in the web who represents its food (put that end of twine in the second child's left hand). The class will begin to experience the tangling network of food chains. Each child in the web will have more than one piece of string in either hand. (All twine held in right hands leads to food. All twine held in left hands leads to consumers.)

For example, the child that is the mouse is eaten by the fox, by the snake, and by the owl, at the same time it eats grasses and bugs.

After the web is set up, *let the class* decide on the member of the web who should vanish (drop or snip his strings and have him sit down in his place.) If the person at the other end of the string has no other animal eating him (or strings in his right hand), he, too, will disappear. Let the children discuss what would happen as the result of each occurrence. (Sometimes there will be an increase, and sometimes there will be a decrease of organisms.)

Note: In the children's discussion of the relationships among the members of the web, have them consider the following:

1. Which is the least important member of the food web? Give reasons.
   What would happen if it was not there?
2. Which is the most important member of the food web? Give reasons.
   What would happen if it was not there?
3. What would happen if there were no natural enemies?
4. How can man sometimes spoil the food web? (By fire, erosion, insecticides, clearing land for houses, overcutting forests, draining swamps.)
5. How can man help protect the balance of nature? (By laws, regulations, educating people in conservation and ecology.)
6. How important is man in nature?

In the world of nature, plants and animals live together in a web of interdependence; each one depends upon the other; each plays a part that helps make the environment what it is. Remember that as we are all important members of our families, the plants and animals around us, including ourselves, are all important members of the food web. All contribute to the balance of nature.

Additional Activities

☐ Review food web when discussing TV nature shows, reading stories, or viewing movies about true and/or make-believe animals.

Environmental Experience 3: Food Web in a Forest

On the blackboard, at random, place pictures and name tags of the following:

1. green leaves
2. ants and beetles
3. fox
4. squirrel
5. garter snake
6. moldy leaves
7. owl
8. racoon
9. berries and nuts
10. mouse
11. robin
12. micro-organisms
13. blue jay
14. earthworm
15. oak tree
16. crow
17. caterpillar
18. spider

Each animal or plant in the above list is a link in a food chain. Connect with string or arrows what the various organisms may consume. Example: The green leaves are eaten by the caterpillar, which in turn is food for the mouse, which is eaten by the snake. Green leaves → caterpillar → mouse → snake. Other chains will form. The caterpillar could be eaten by the robin, which may be eaten by the snake.

Green leaves →
caterpillar →
robin → snake.

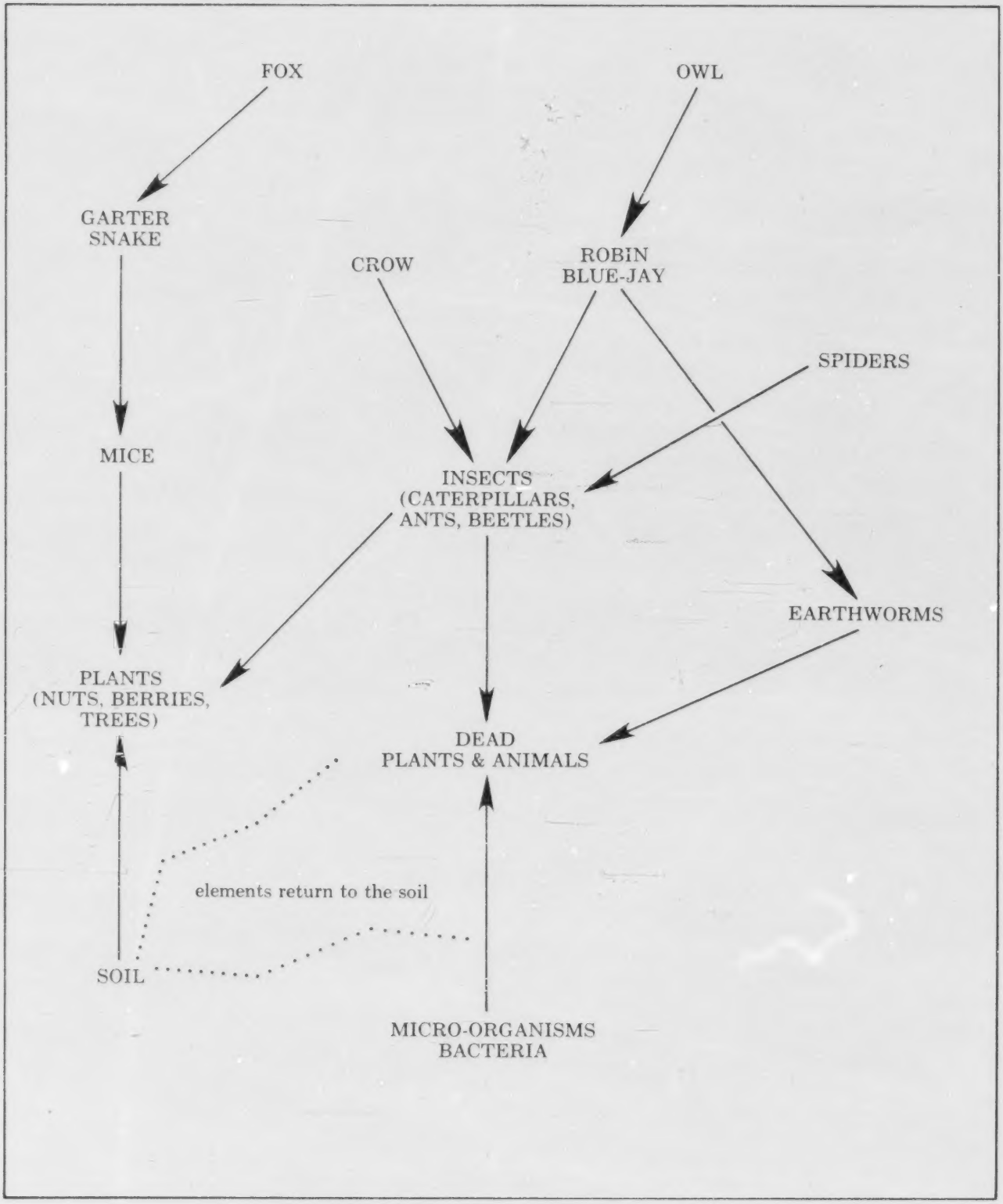
As more and more food chains form, a network will appear and form a web.

Encourage the children to use the links of a food chain and webs to develop their own puzzles, stories, poems, songs, shadow boxes, dioramas, and papier mâché animals and plants.

Additional Activities

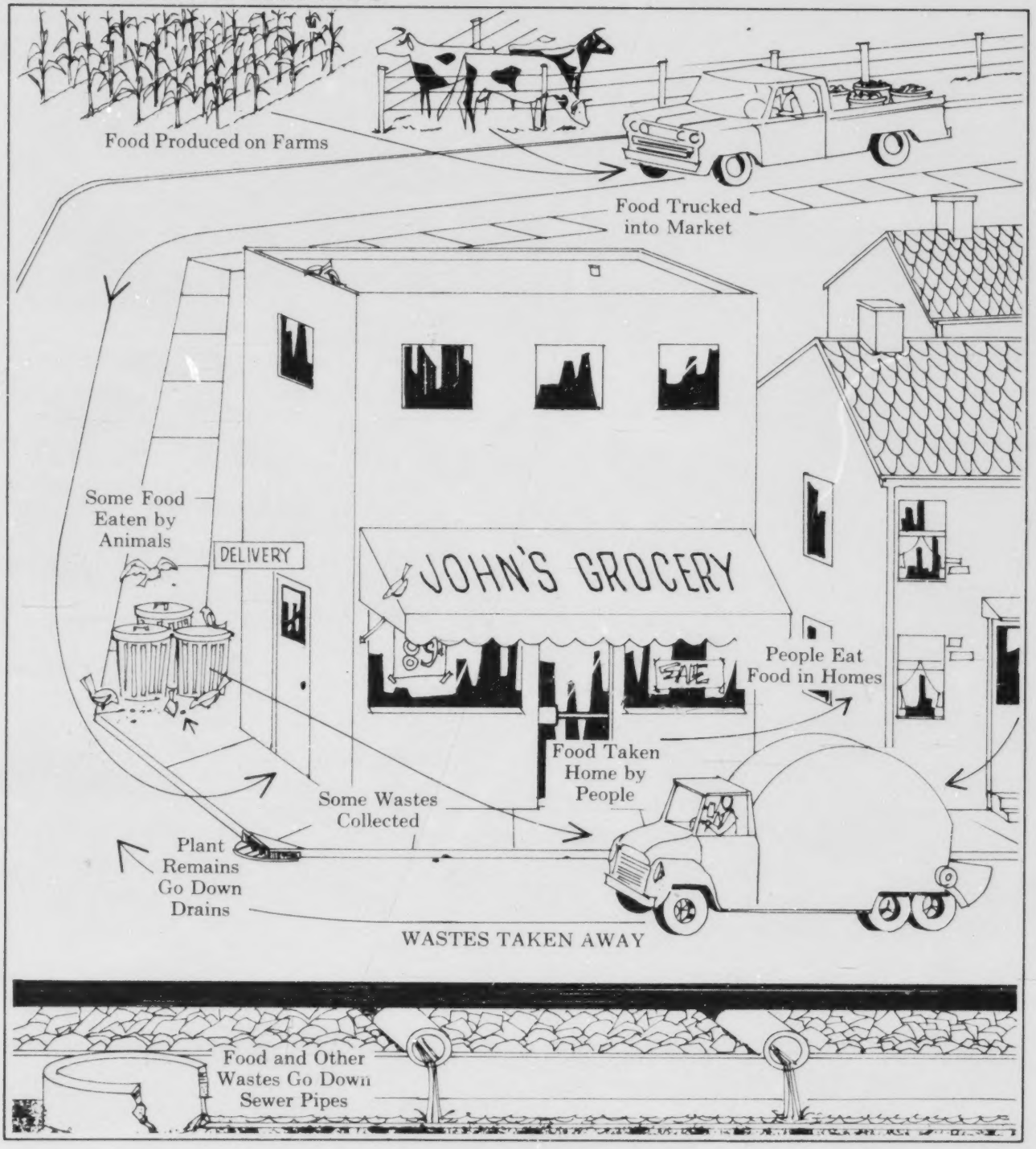
- ☐ Adapt song games to teach interdependence.
- ☐ Develop food webs of the school yard, the neighborhood; build an aquarium, a terrarium.
- ☐ Extend the food chain idea to the school lunch program. Trace and discuss the food chains related to the lunch the children eat.
- ☐ Go outside and look for evidence and clues to the school yard food web (tree, robin, grasshoppers, grass, spider, nuts, fruit, seeds, leaves, feathers, cocoons, house cat, mouse). Collect the things that can be taken back into the classroom as evidence of the food web and display them.

EXPERIENCE 3: FOOD WEB IN THE FOREST
The arrows point to the animal or plant that is consumed.

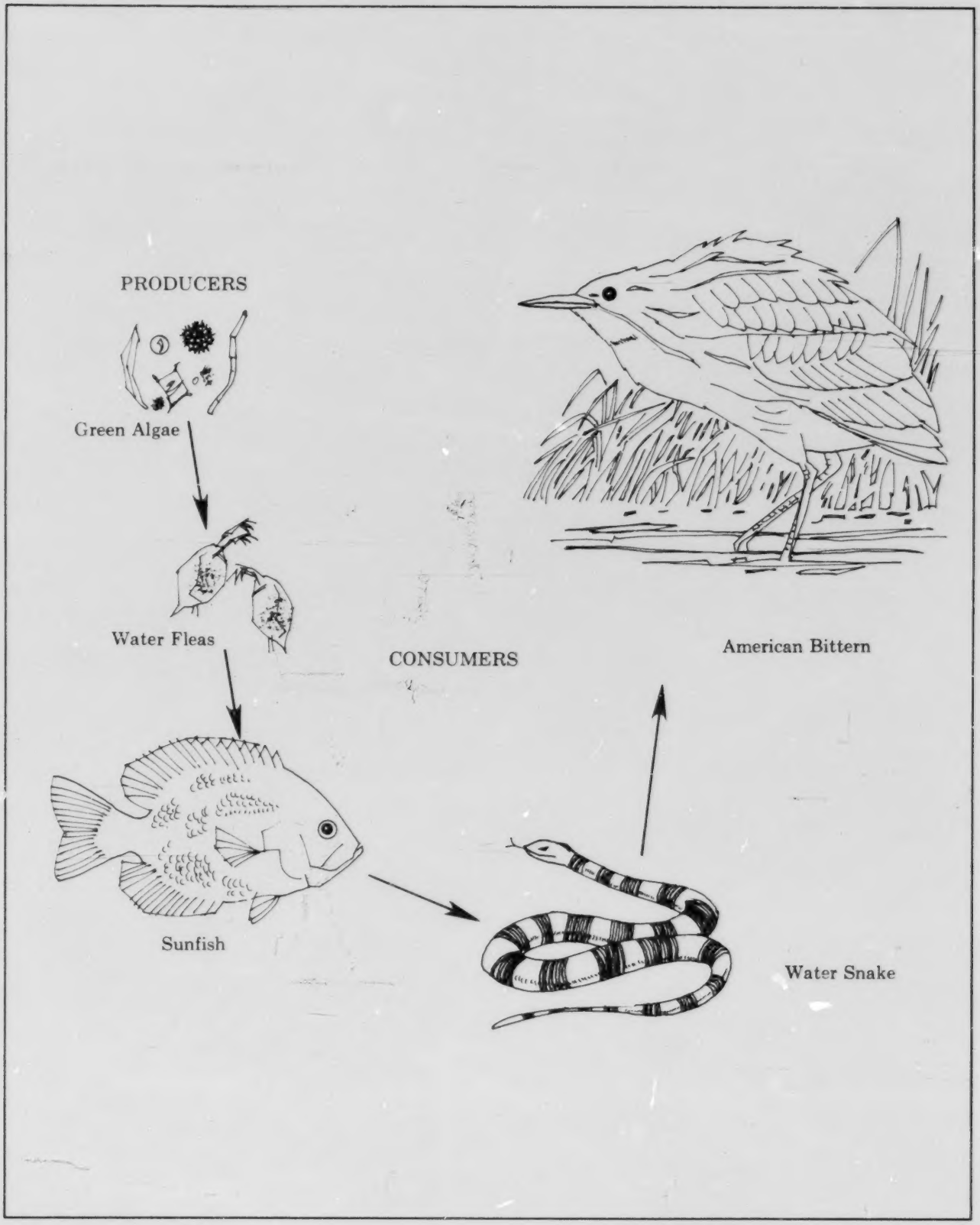


Appendix

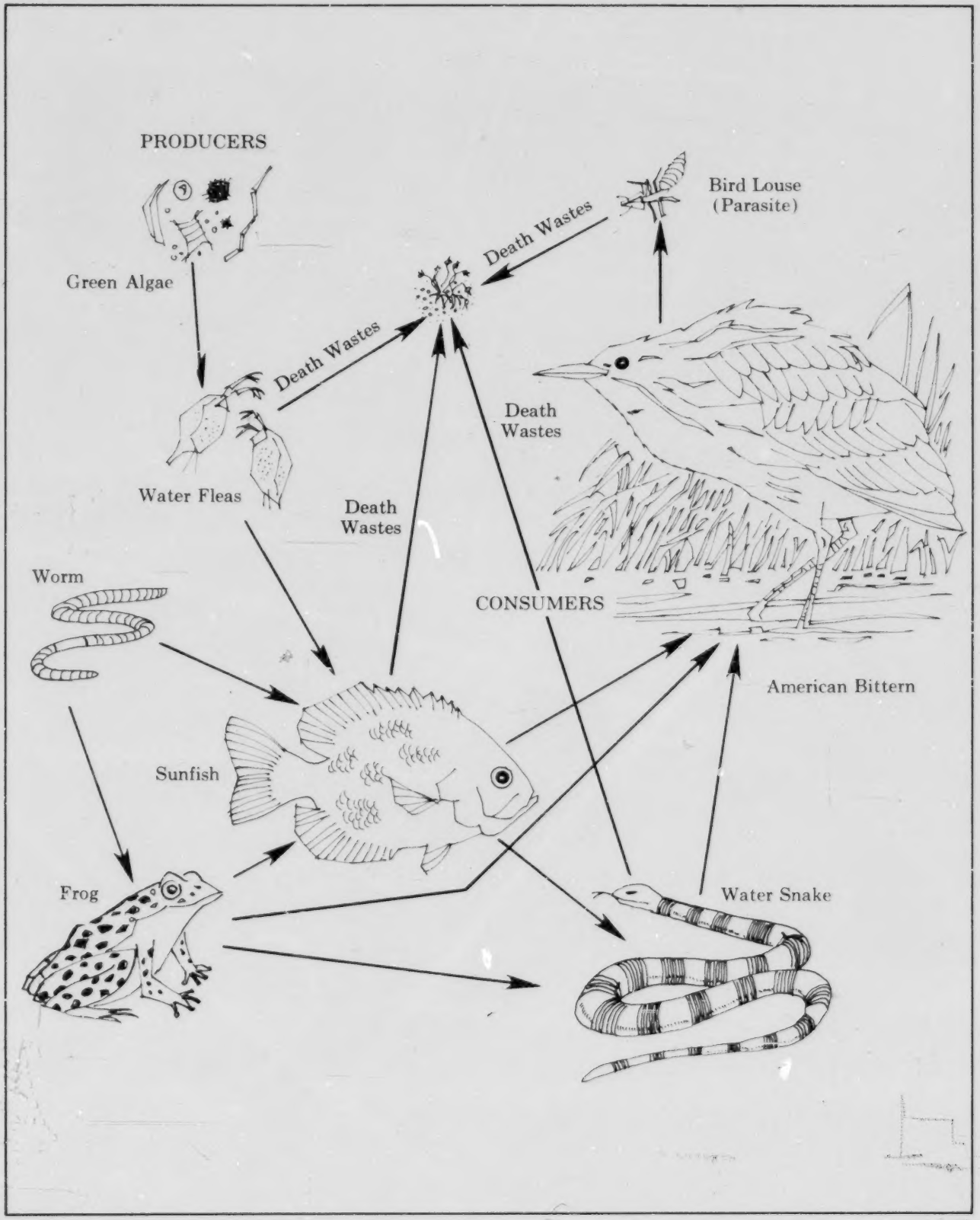
FOOD CHAIN IN THE CITY



ONE POND FOOD CHAIN



ONE POND FOOD WEB



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Birds in our Lives

The study of birds has been an important aspect of the school curriculum for many years. Today, with the growing environmental crisis, the study of one of the most easily observed forms of wildlife can take on new dimensions for the student. Observing birds and their adaptations is an important step in understanding the total ecology of the planet Earth.

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BIRDS IN OUR LIVES

Unit Objectives:
Children will describe:
1. the interrelationships of birds in the environment
2. the characteristics of birds that help them adapt to the environment.

Environmental Experience 1: Identifying Birds
Begin the experience by discussing what clues we use to identify each other. Discuss what clues can help us identify birds. Then prepare a bulletin board of bird pictures. Try to display as many types of birds as possible. Ask the children to list the clues that they think might help to identify the different kinds of birds in the pictures. The clues may be classified in different ways.

Size — larger or smaller than a robin
Color — where are the colors
Shape — long bill, tall and skinny, fat
Song — whistle, chirp, harsh call
How it flies — flaps, soars, flaps and soars
Where it lives — forest, city, field

or

Water Birds
Song Birds
Game Birds
Pet Birds
Hunting Birds

or

Birds of the Swamp
Birds of the Dooryard
Birds of the Forest
Birds of the Storybooks

Additional Activities

- ☐ Discover on a spring field trip common birds of the community. Have each child study a different bird and be alert for "his" bird on the field trip. Prepare the class with a film about common birds (see Appendix).
- ☐ Do a bird unit each season with a different emphasis.
  Fall — Migration
  Winter — Winter birds and feeding them
  Spring — Nesting and songs
- ☐ Write cinquain and Haiku poems about birds' appearances, movements and sounds.
- ☐ Dramatize stories about birds from books (see Appendix).
- ☐ Dramatize bird movements.
- ☐ Make individual booklets to record things learned about birds. These can include class and individual stories about particular birds, illustrated with drawings to show birds used for food by people; birds used for pets; the child's favorite birds. You may also want to include pictures of birds cut from magazines.
- ☐ Set up a tape recorder. Present pictures of common birds, one at a time. Children take turns making two sentences; one to identify the bird, and the other to name one thing about the bird. Tape children's responses.
- ☐ Alphabetize lists of birds' names.

Environmental Experience 2: Neat Feet, Wings, and Other Things
Read to the younger students a story or show a film about bird adaptations and discuss how birds, like people, have special tools (body parts) to help them live.

A more advanced class (1st to 2nd) can design a perfect bird suited to its environment. Begin by describing a hypothetical island with certain environmental conditions.

For example: design a bird to live on the island of Oogh. Oogh is partly covered with water and mud, three feet deep, and has six-foot trees with jelly bean fruits. What type of body parts would a bird need to survive there?

Have the class design any type of environment it wants and with many environmental factors: rain, sun, enemies, and so forth. Divide the class into small groups to discuss and design the bird. Each group or child could then produce a drawing of a bird. Post the drawings for all to see and to question. The group can then lead into a discussion of real bird adaptations.

Post pictures of several different types of birds showing a diversity of adaptations. Have the children relate what they know about the birds in the pictures to what they eat, where they live, or how they move. Draw correlations between body parts and the bird's environment. Post pictures of or draw on the board specific parts; beaks, feet, wings, relating the bird's life cycle to its environment.

Environmental Experience 3: Hark-A-Lark or Bird Sounds
Prepare the class for an outdoor school site lesson to listen for bird sounds by listening to a record of a bird song (see Appendix). Have the children listen and identify different types of bird sounds.

On the school site, have the children listen for calls and songs of birds. The children should be very still and when they hear a bird call, they should hold up one finger. When they hear a second call, a second finger should be held up and so on. Try to find the bird making the call and gather clues to its identity by using clues from Experience 1. When back in the classroom look in a reference book for the birds seen and heard.

The calls of birds often become indistinguishable in the background noises of the environment. This experience should pinpoint the diversity of birds that can be found on the school site and develop listening skills. Keep a record of the number of bird calls heard over the school year.

Additional Activities

- ☐ Trace the food webs of the various types of birds.
- ☐ Listen to compositions written about birds which use high bird-like sounds of the flute and piccolo. Experiment with these instruments, if available, or with whistles (from rhythm band sets).
- ☐ Have the children tell which bird they would like to be and why. After a whole-class discussion on

this, their answers could be recorded and played with some of the "bird music" for the background.

- ☐ Have the children prepare a written or oral description of a bird and then ask "Who am I?" Description could include some clues such as habitat, shape, size, color, type of nest, eating habits.

Environmental Experience 4: Bones

Collect enough chicken bones to allow small groups of children to examine them. Also, have some beef bones present for comparison with the chicken bones. Have the children handle and examine the chicken bones. Ask them if they have ever bitten into a chicken bone; what was it like? Can they think why people who own dogs won't feed chicken bones to their pets?

Cut a bone both crosswise and lengthwise to show the hollowness of the bird's bones. Compare the shape, weight and structure of the hollow chicken bones with the solid, heavy beef bone. Ask the children to discuss the advantages of hollow bones for birds and why mammal bones wouldn't work for birds.

Additional Activities

- ☐ Compare the chicken's skeletal parts with other animals, such as insects, reptiles and humans.

Environmental Experience 5: Feathers

Ask the children to look for feathers during their out-of-school time and have them bring them to class.

Encourage the class to handle the feathers, drawing the feather back and forth through their fingers. Have the children notice how they can always be put back into the proper shape by drawing the feather between their fingers.

Have each child examine, with a magnifying glass, the feather, so that he notices how the barbs of the feather hook together. The hooking together of these very light parts provides the strength a bird feather needs to withstand the pressures of flight.

Examine down feathers and discuss how down helps the birds keep warm. Perhaps someone may have a down jacket or sleeping bag and can tell about how warm it is.

Compose a list of the reasons birds have feathers.

Environmental Experience 6: Bird Helpers

Ask lead-in questions: why do we want birds around? Are they useful? What do they do for us?

Discuss what birds eat. Farmers are helped because the birds eat many insects that destroy their crops. If the crops are destroyed are we going to have all we want to eat when we want it?

Birds also help us plant and spread seeds. When they eat seeds, some are not digested. In their droppings the seeds are transferred from place to place. Certain plants, such as wild grape, pokeberry and mistletoe, depend on birds to plant seeds.

Some people make things from bird feathers; for example, pillows, quilts and certain types of winter clothing are stuffed with down.

Others enjoy simply watching birds for their beauty in color, movement and song.

Think of other reasons birds are vital members of our biosphere.

Appendix

TEACHER BACKGROUND INFORMATION

BIRD ANATOMY

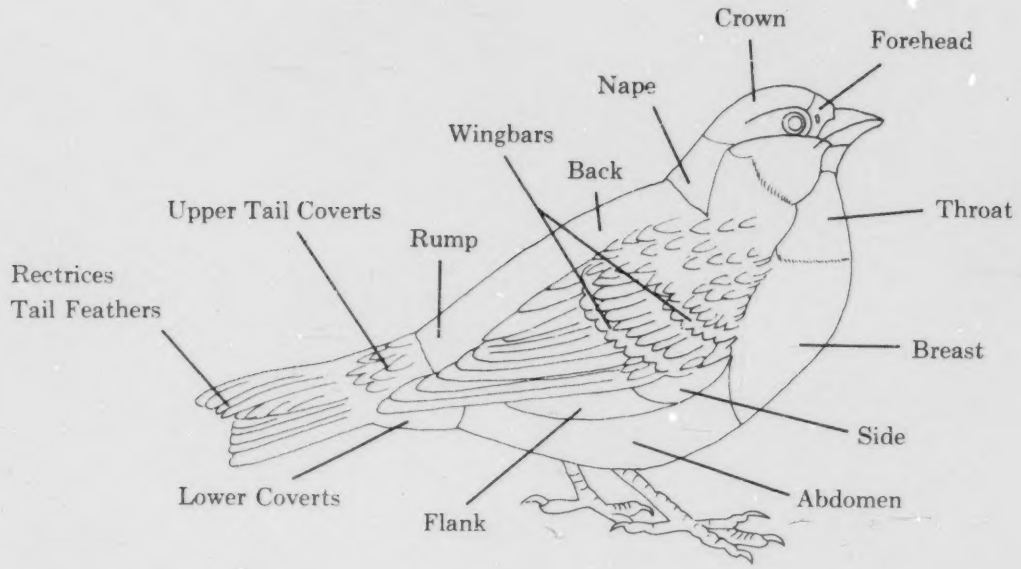
How a bird is marked by distinctive coloration or some predominant characteristic of shape or form often is the quickest and easiest means of identification.

Characteristic Markings

We expect a white-crowned sparrow to be a sparrow-like bird with a predominant white crown or top-knot on its head. A white-throated sparrow would be a sparrow-like bird with a distinctive white patch on its throat. Knowing that a bobolink is a black bird with a conspicuous white back is enough to identify this species, especially if we know the bird is about the size of a robin and is usually found in weedy meadows in late spring and summer. Wing bars, breast markings, shoulder patches and the shape or length of the bill, are common means of identification.

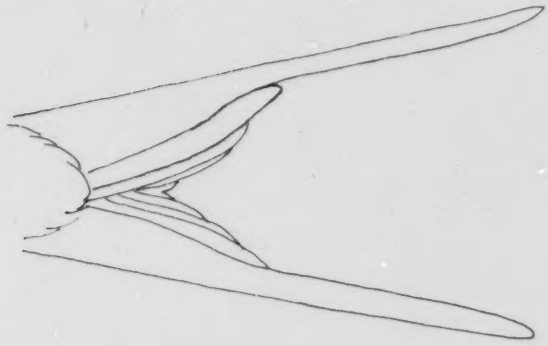
Bird Topography

It becomes evident, then, that if we are going to learn some of these characteristics by which birds can be identified, we must know the principal parts of a bird's external anatomy or topography. The general layout of these parts is much the same on almost all birds, so a general plan can be used to learn these parts. The drawing used here is no particular species but it is predominantly sparrow-like, because so many species of birds can be compared with sparrows in size and shape. Studying the parts illustrated and memorizing them is an important step in bird identification.

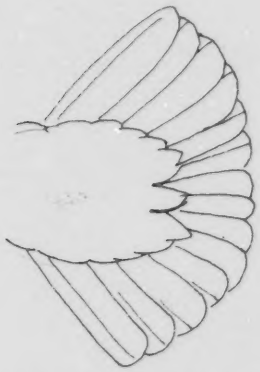


Adaptations of TAILS

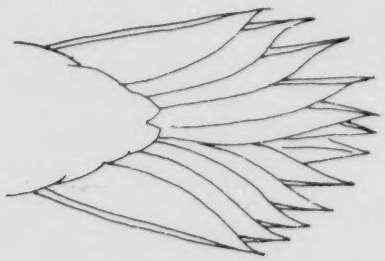
TAILS provide balance when perching and flying; are rudders during flight.



Some birds have long, forked tails for graceful, skimming flight and extreme maneuverability.



A broad, fanned tail is good for soaring.



Tail feathers with strong, spine-like tips give some birds support when clinging to vertical surfaces.

Adaptations of BILLS

BILLS of birds are variously adapted for procuring different foods and serve also for nest building, preening feathers and protection.

Slender, pointed beak for picking up insects.

Short, thick bill for crushing seeds. Upper and lower mandibles crossed to enable bird to extract seeds from cones of evergreen trees.

Long, slender bill for probing in mud in search of food.

Short, stout bill for feeding on the ground.

Long and sharp for spearing fish.

Adaptations of BILLS *(continued)*

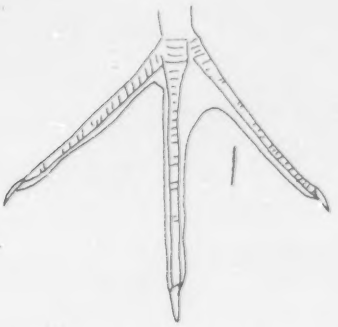
A flexible pouch underneath bill holds captured fish.

Strong, sharp, hooked bill for tearing flesh.

Broad, flattened bill for straining food from mud.

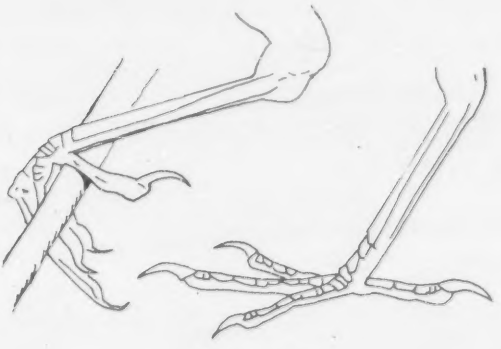
Adaptations of FEET

FEET are built for perching, scratching, walking, swimming, for seizing prey.



The three long toes keep wading bird from sinking into the mud.

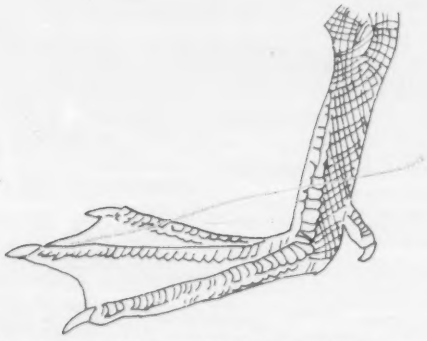
Claws strong and blunt for raking or scratching the ground for food, as a hen.



Three toes in front, one toe behind automatically clasp the perch when the leg is relaxed.

Adaptations of FEET *(continued)*

Two toes in front, two toes in back; sharp claws for clinging to an upright surface.

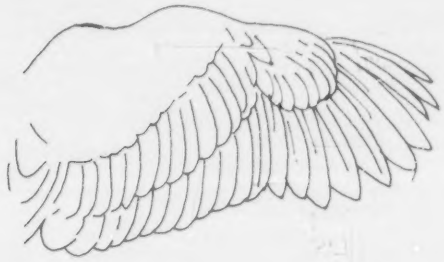


Three front toes fully webbed for swimming.

Powerful feet and legs with strong, curved, sharp talons for grasping prey.

Adaptations of WINGS

WING size and shape vary greatly. Some wings are designed for soaring, for sudden turns and rapid flight, for easy long distance travel.



Short, rounded wings for speedy take-off and fast flight over comparatively short distances.

Long, broad wings for strong, soaring, effortless flight.

Long, pointed wings for fast, easy flight in the pursuit of flying insects.

CLUE CHART FOR BIRD IDENTIFICATION

Size	Shade	Shape	Surroundings	Sweep	Song

Bird Characteristics

Size

Is the bird larger than a sparrow (six inches)? or a robin (10 inches)? or a crow (20 inches)?

Shade

Areas of the body where colors are located (variations in color at the throat, belly, wings, tail, and markings of feathers)

Shape

a. body shape (plump, sleek, thin, short and stubby, or streamlined)
b. head and bill shape (bill is thick or thin or long or short)
c. tail shape (rounded, wedge, square, notched)
d. wing shape (rounded, pointed, ragged)
e. leg shape (long or short)

Surroundings

Where was the bird located? (tree top, vertical position on tree trunk, in a wooded area, meadow, telephone wire, fence post, prairie, along the country road, swimming or floating on water, other)

Sweep

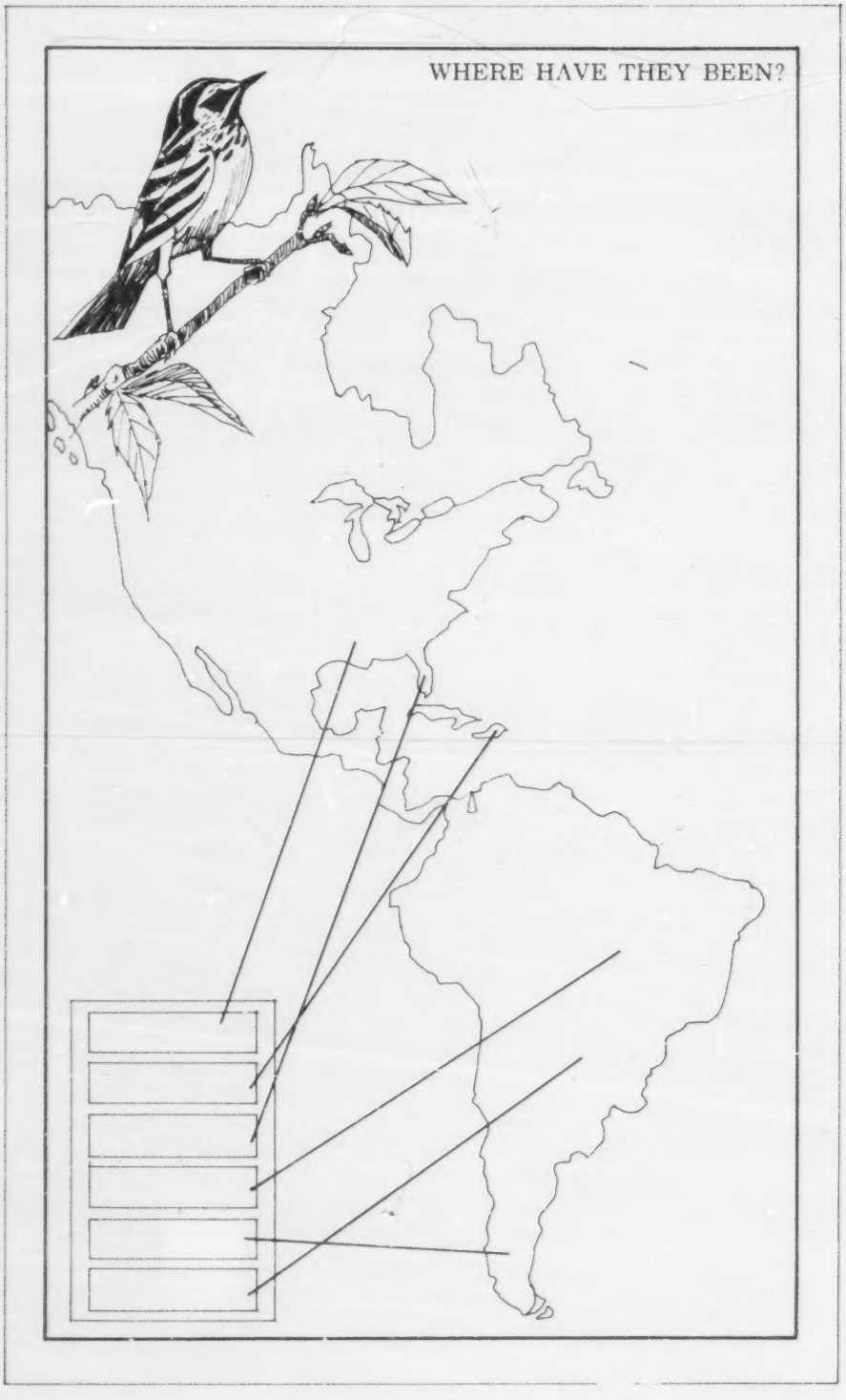
What were the flight characteristics? (jerky, darting, swooping, irregular flight)

Song

Are there phonetic sounds such as "raspy," "chip-chip," "peter-peter" or a trill?

BULLETIN BOARD IDEA

for migration of birds



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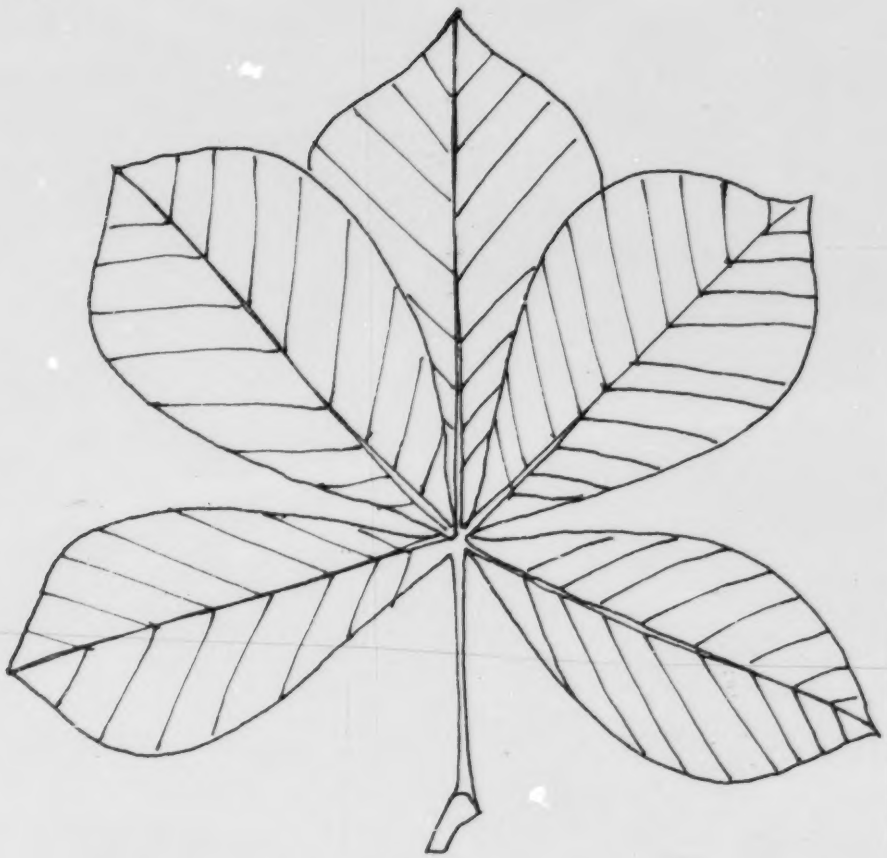
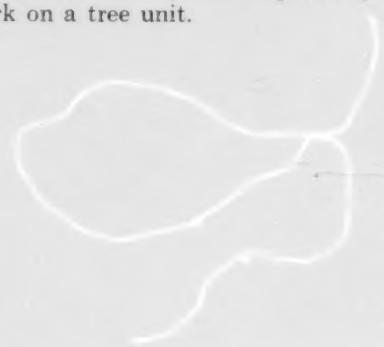


Trees

The study of trees is an important aspect of most school curricula. This unit is designed to provide the students with more than a textbook approach. Each activity is designed to involve the students in activities that will enhance their understanding of trees and their relationship to the total environment. Several of the experiences are out-of-doors, which is probably the best place to work on a tree unit.



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TREES

Unit Objectives:
Children will be able to describe how a tree changes during the school year.

Environmental Experience 1: Trees Are Different
Prepare the children for an outdoor experience to look at trees and collect leaves and seeds. With the class, examine the school site or neighborhood and try to find at least four different types of trees. Have the children examine the trunk of each different tree with their hands. How does it feel? Smooth? Bumpy? Slippery? Rough? What color is the bark? With big sheets of paper and a large soft pencil or crayon (carefully, the paper may tear) make a rubbing of the bark of the different trees to take back to the classroom. Discuss with the children the types of bark patterns they have found and tell them that these patterns can be used to tell the trees apart. Note with the children how the pattern of the tree trunks can be copied on paper, and suggest that perhaps other kinds of patterns can be copied.

Additional Activities

- ☐ Read a story or verse to the class, or show them a film about trees. Have the children look for other items that they can make rubbings from: boards, telephone poles, parking lot posts, books, rocks, peg boards, bricks, in order to distinguish different patterns.

Materials
Soft pencil or crayon
Paper

Environmental Experience 2: Tree Leaves Are Not All The Same
On a trip around the school site, have each child, or a team of children, collect one leaf from each type of tree. Provide each team with a different leaf, and have the children locate the trees that are similar to theirs. Have the children insert the leaves in a book to protect them until they return to class.

When back in the classroom, encourage the children to examine their leaves for anything that makes them unusual or different from other leaves. Look for shape, color, texture, rips, and chewed parts, insect evidence, or any other distinguishing characteristics. If something is found that makes the leaves distinctive from others of its kind, have the child show and tell it. After the children have made crayon rubbings, clay impressions, blue prints or splatter prints of the leaves, display them on the bulletin board.

Additional Activities

- ☐ Introduce the roles of leaves in making food for the trees and oxygen for people and other animals.
- ☐ In the spring, children can watch the emergence and growth of leaves and correlate this with their own growth.

Environmental Experience 3: Adopt a Tree
Explain to the children that you would like them to adopt a tree on the school ground. Tell them that adopt means they are to get to know the tree and take care of the tree as a part of their school family. Choose a tree that is not evergreen and has branches low enough for the children to observe. After choosing the tree, tie a shipping tag on a branch to identify the tree (e.g., Mrs. Jones' 2nd Grade). Be sure the tag is out of reach, but not out of sight. Spraying the tag with varnish will help to weatherproof it. Visit the tree as often as necessary or as the seasons change. Discuss with the children the seasonal changes as they relate to the tree. Ask them to observe at recess or lunch any animals that may find the tree friendly. Be sure the children have a chance to observe the tree often. As the buds begin to develop, try to discover which buds are leaf buds and which are flower buds.

In spring, it may help to snip a small branch and bring it indoors to try and force it to flower and leaf by putting it in water on a sunny window sill.

Additional Activities

- ☐ Sketch the tree at different seasons — during rain, snow and sun. Take pictures.
- ☐ Adopt an evergreen tree.

Environmental Experience 4: Naming Trees
Walk on the school grounds and tell the children to pretend they are scientists, naming the trees for the first time. The names should reflect a characteristic of the tree so that a stranger could find the tree by its name. The trees could have fall, winter, spring names. For example, a large white pine tree might be called the "soft-needled, green, tall tree," or the "long, straight-armed tree." Allow the children to be as creative and imaginative as possible. Invite another class to see if they can discover the trees by their names, or let the children work in small groups, name three or four trees and trade the names to see if they can find each other's trees. Be sure to use all the senses when discovering characteristics about the tree. How do the leaves smell, look, or feel? Is the bark rough or smooth?

Additional Activities

- ☐ Make a map of the school site, plotting where the trees are. Visit the trees throughout the year to observe changes.
- ☐ Make a bulletin board of trees that have descriptive names, such as shag bark hickory, white birch, musclewood, sweetgum, hawthorn.

Environmental Experience 5: Stump Scouting
On the school grounds find a tree stump or round wooden parking lot post. Have the children examine the top of the stump to discover what type of pattern the inside of a tree has. The rings of the stump are annual growth rings and tell the age of the tree when it was cut. Have the children make rubbings of stumps and posts to take back to class. In class, the children can count the rings and compare the differences in ages of the trees.

Additional Activities

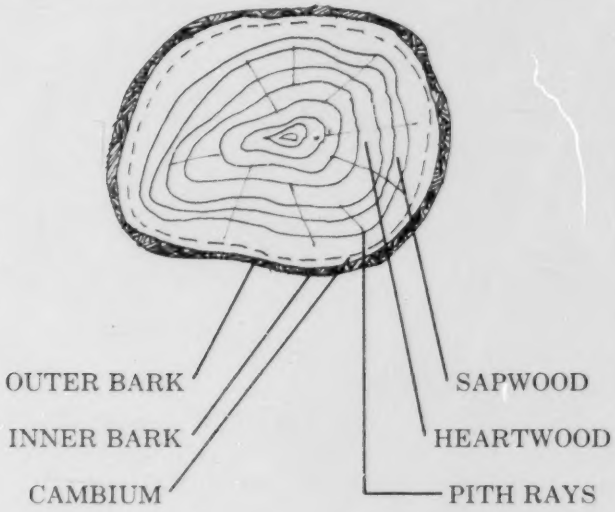
- ☐ Have someone cut a section of an old tree to be placed in the classroom. Make a display of the cross section correlating the years of the rings with children's birthdays, when the school was built, other events.
- ☐ Start a wood collection, showing the various colors and patterns of the wood.

Appendix

TEACHER BACKGROUND INFORMATION

Cross-Section of Tree Trunk

The trunk of a tree performs two simple functions: it holds the crown or top of the tree erect in the sunlight and it acts as a giant pipeline to transport the food and water between the roots and the crown. There are several important parts of a tree trunk and they are located as shown in the cross-section sketch.



Outer Bark — This rough, corky surface acts as the skin to protect the tree from diseases and insect damage. Bark grows from the inside out; the oldest is on the outside, the youngest is next to the wood. Annual growth rings are formed in the bark much the same as in the wood, but usually the older outside rings are pushed off or have cracked into a rough surface by the inner pressure of the growing tree.

Inner Bark — This thin inner layer may sometimes be called part of the cambium, for it is through this thin ring of tubes that the "prepared food" from the leaves is carried to the cambium and down to the roots. To kill a tree by girdling, a ring of bark through the inner bark and cambium is removed. This cuts off the downward movement of food to the roots and prevents sprouting of new growth from the stump and the roots.

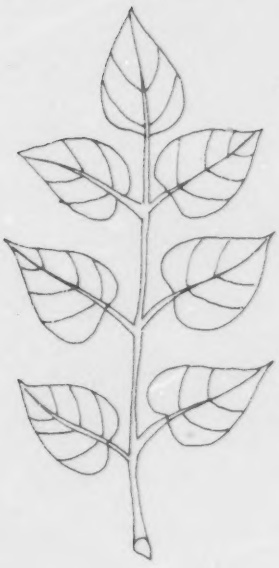
Cambium — In this microscopic ring the new growth takes place. The cells in the cambium keep dividing and thus add new cells to the outer ring of sapwood and to the inner layer of bark. While wood is always oldest at the inner ring, and youngest at the outer ring, the bark is oldest at the outer layer and youngest at the inner ring. The bark, inner bark, and cambium together comprise a very thin layer from ⅛" to 2" thick depending on the age and type of the tree.

Sapwood — This light-colored outer ring of wood, surrounding the heartwood, is the part of the tree that carries the "sap" or water from the roots to the various parts of the trees. The "sap" flows through the sapwood by inter-cellular action. Sapwood may be very thin, containing only one or two annual rings, or very thick, containing up to 100 rings.

Heartwood—The sapwood over a period of time slowly ceases to be part of the active or living part of the tree. This comes about by the continual formation of new sapwood in the outer rings. In other words it changes from living or "sap" wood into dead or "heart" wood. Heartwood, the innermost section of the tree, is usually darker in color and denser, and is the storehouse for the various gums, resins, and deposits which are responsible for its being more durable. A good example of heartwood is found in black-locust, red cedar, black walnut and white oak.

LEAF ARRANGEMENT

Bi-Pinnately Compound Leaf

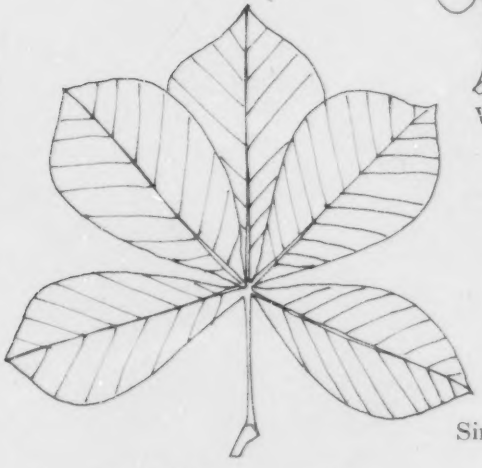


Palmately Compound Leaf

Alternate

Opposite

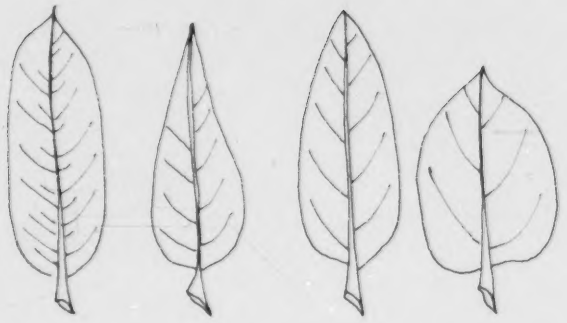
Whorled



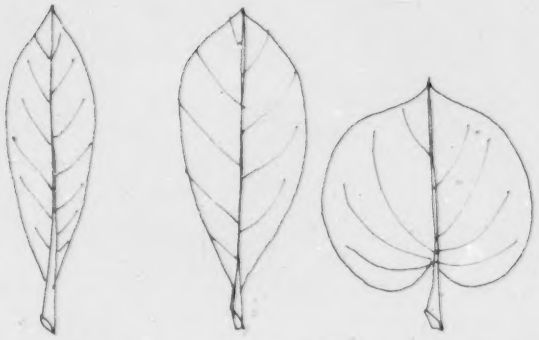
Pinnately Compound Leaf

Simple Leaf

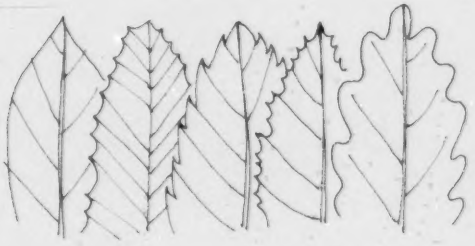
LEAF FORMS



Oblong Lanceolate Elliptical Oval

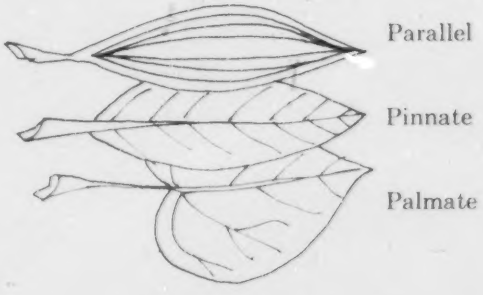


Oblanceolate Obovate Heart-Shaped



Entire Dentate Serrate Doubly Serrate Lobed

VEINING



Parallel

Pinnate

Palmate

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Studying Hardwood Trees, Minnesota Mining & Mfg. Co., Film Library, 2501 Hudson Rd., St. Paul, Minnesota 55119.

Picture Sets

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Growth of A Tree, American Forest Products Industries, Inc., 1016 N. Street N.W., Washington, D.C. 20036.

Trash

The study of trash is really the beginning of a fostering of certain values that have social as well as ecological importance. Ideally, the experience with trash can begin to introduce children to the role each person has in the solution of the environmental crisis.

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TRASH

Unit Objectives:
Children will become aware of and experience ways to eliminate or re-use as much trash as possible throughout the year.

Environmental Experience 1: What Is Trash?
Encourage the children to observe (or collect) the garbage from one day in the lunchroom or in their classroom. Begin here to separate the things into the three categories and have the children discover why some things are recyclable (can be used again), bio-degradable (things that readily decay), or neither (solid waste).

Have the children work out definitions of the terms. Then proceed to separate the categories.

Additional Activities
- ☐ Discuss the local disposal system and ways it could be improved.
- ☐ Sing "I Love Trash" and discuss how Oscar, from Sesame Street, is using what other people throw away.
- ☐ Bury some different types of trash, either in a container in the classroom or outdoors and have a periodic unearthing to see what is happening.

Environmental Experience 2: Trash Management in the Schoolroom
Set up three containers (waste baskets) and mark them recyclable, bio-degradable, and solid waste. Place used papers in the recyclable container (A rectangular carton into which the papers fit would be better than a round container.)

Tell the children to put their papers flat into the carton and not crumple or tear the paper up. When the carton is full, have it stored until a local organization has a paper drive. Keep a record on the blackboard of how many cartons are filled per semester. Remind the children that paper comes from trees and if we save paper, we can save trees.

Ask the children to list ways we can save paper. Remind them they can also save paper and trees by conserving paper at home and in other places. Tell them to remind their parents to save paper and trees.

The bio-degradable container should have a plastic bag lining into which are deposited things that decay readily. Some things that might be put into this container are facial tissues, food scraps, pencil shavings, and natural materials that the children bring in and need to be disposed of (leaves, flowers, mud, fruit, seeds). This container should be emptied daily in a corner of the school grounds or someone should take it home to be deposited in a compost pile.

If you reach an agreement with the principal and custodian on where the material can be deposited, a compost pile can be started on the school ground. In a few weeks, the compost material will break down into crumbly, rich, organic material which then can be put on classroom plants.

Have the children become aware of the use of so-called waste that can be bio-degradable, or things that rot. Remind the children that grass clippings from their lawns and other material can be used for fertilizer on their gardens and lawns.

The only real "waste" basket is the one that glass, plastic and cans go into. Some of these things can be recycled, but usually they are bulky items and storage is a problem. Also, the means for recycling this material is often non-existent in a local area. However, if a suitable recycling alternative is available, you may want to separate glass and aluminum to be recycled.

One of the best ways to handle the solid waste is to extend its use. Some material may be useful for arts and crafts projects, science experiments, or any other things that you might find a need for. (Most teachers do this anyway.)

The whole idea of the garbage experience is to begin to foster a recycling attitude in the children. They can help with part of the environmental problem.

Additional Activities
- ☐ Make a collage or sculpture out of solid waste.
- ☐ Visit a landfill or incinerator.
- ☐ Keep a scrap box of reusable items.
- ☐ Start a school-wide beautification project.

Environmental Experience 3: What Is Litter: Is It Trash?
Discuss litter — what is it? Make a list of in-school litter: litter in the classroom, on the playground and in the surrounding area the children see going to and from school.

Collect waste basket containers for each child. Have the children decorate a container and put it next to their desks for their personal trash. At the end of a day or week, everyone can measure and evaluate the contents of his trash container prior to emptying the contents into a large basket.

Additional Activities
- ☐ Discuss what can be done in the classroom to cut down on litter and conserve material. Have the children look for wasteful practices and make up rules for conserving resources. Some things that are wasted: crayons, paper, paste, pencils.
- ☐ Encourage the children to eliminate litter on their way to school by bringing in one or two pieces of litter per day.

Environmental Experience 4: Lunch Room Trash
Ask the children what kinds of trash problems occur at lunch time. What do they use or not use at lunch that could become trash? List some ways that trash could be eliminated or reused.

Some problems they can discuss: eating all of their lunch or having mother not pack as much; saving paper bags and wrapping material; keeping the lunchrooms neat.
Work on solutions to the school lunch room trash problems.

Environmental Experience 5: Trash at Home
Have the children discuss the trash problem at home and how it could be eliminated or cut down. By now

the children can draw from their experiences in the classroom to think of ways they could help at home. Discuss usable, every-day items, such as returnable pop bottles, grass clippings, newspapers, and old clothes.

Extend the classroom ideas of compost, not wasting paper, making things out of scraps and extending the life of certain materials to the home.

Additional Activities

- ☐ Ask other classes to cooperate in a school-wide recycling program. Many tons of paper can be saved and recycled along with glass and other solid waste.
- ☐ The kitchen of the school can provide a good place to obtain bio-degradable material for the compost pile. In fact, two garbage containers could be set up in the kitchen; one for food scraps and the other for solid waste.
- ☐ Make a list of ways people are wasteful, and ways to save materials.
- ☐ Go to the supermarket and check the different types of containers, to determine which ones are wasteful.
- ☐ Think of all the things that can be done with the plastic egg-shaped containers from "L'eggs" hosiery, and try some.

Appendix

TEACHER BACKGROUND INFORMATION

CROSS SECTION OF A COMPOST PILE

Wet each layer well and cover with burlap, hay or weeds. Occasionally poke holes through all the layers with a stick to allow air to circulate. Keep the compost pile moist but not wet. Most material put in the compost pile will decay faster if chopped into small pieces.

MANURE
LEAVES
GRASS CLIPPINGS
KITCHEN SCRAPS
MANURE
KITCHEN SCRAPS

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The Third Pollution, 23 min., Color, Stuart Finley, Inc., 3428 Mansfield Rd., Falls Church, Va. 22041.

Uncle Smiley Goes Recycling, 13 min., Color, Learning Corp. of America, 711 Fifth Ave., New York, N.Y. 10022.

Yours for a Change, 15 min., Color, Pepsi-Cola Co., 500 Park Avenue, New York, N.Y. 10022.

Filmstrips

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Dirt and Stuff

Encourage the children to discover, using their senses, that soil is not just clumps of dirt or something Mom reminds them not to play in, track indoors, or get all over their clean clothes.

Create a learning atmosphere which will let children verbalize and illustrate their involvement using their own words and methods of illustration.

The activities in the unit will let the children see that there are many different kinds of soil which support different kinds of plant and animal life. The need for conservation will become apparent to them as they examine a piece of turf and discover the complexity of the living and non-living parts of the soil.

The experience titled "The Magnificent Piece of Turf" incorporates a challenge to emphasize the reality that man is very adept at taking things apart but does not do nearly as well at putting them back together.

The beauty of the whole unit is that the teaching aids are waiting for you right out in the school yard.

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DIRT AND STUFF

Unit Objectives:
Children will be able to observe:
1. the importance of soil for plants and animals.
2. the diversity of soils.

Environmental Experience 1: Looking at Soil
Bring in three pails of soil samples:
Pail 1: Rich garden soil
Pail 2: Clay
Pail 3: Very sandy soil

Step 1: Dump the three pails on three plastic sheets and let the children play with the soil. Ask them to funnel the dry soil to discover which soil passes through the funnel best. After they have noted which soil flows best through the funnel, ask them to explain why this happens.

Step 2: Pack the three dry soils into three baby food jars. Label the jars as to soil contents. Add an *equal* amount of water to each. Ask the children to observe which soil allows the water to soak in the fastest.

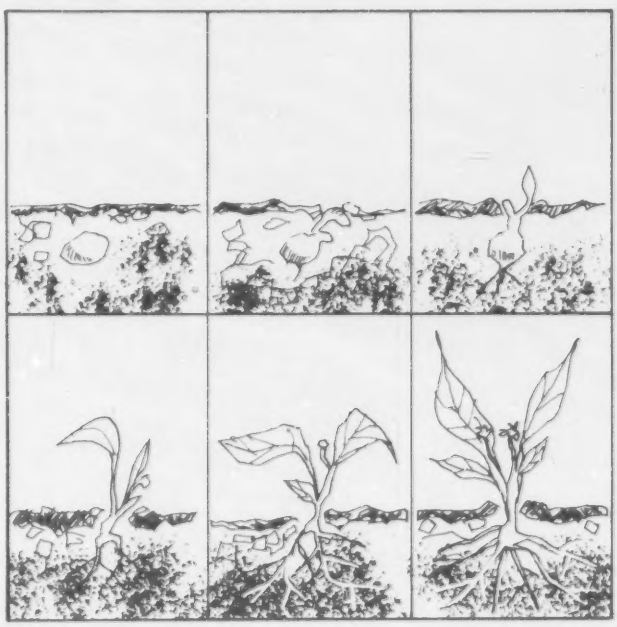
Step 3: Let the children make mud balls. Let them discover which soil (when dampened) will make the best mud ball, and which makes the worst mud ball.

Step 4: Have the children identify the three kinds of soils, using *their own words*.

Additional Activities

- ☐ Use the words the children have given the soils to make flash cards, verses and rhymes, nonsense stories, riddles, poems, and dramatizations, e.g., digging a garden. (See appendix for examples.)
- ☐ Compare the weights of the mud balls. Compare the volume of water absorbed.
- ☐ Plant bean seeds and/or pumpkin seeds in the three kinds of soil and observe their growth. Plant three to four seeds in each container.
- ☐ Unearth the seeds at different growth stages to observe how a plant emerges from a seed. Have children record the growth by drawing the changes of the seed and seedling. The drawings could be used for a bulletin board or a chart.
- ☐ Place the containers with the seeds in light and proper conditions, in darkness (watering regularly) and in darkness with no water or sunlight. Record the watering cycle and growth patterns.
- ☐ Make a map of the school site. Note all the different surfaces, types of soil, gravel, asphalt, concrete, and so forth. Note how many places can absorb water and support plants.
- ☐ Use the transparency "How a Bean Seed Grows" to review activity.

How Bean Seed Grows



- ☐ Shape clay found on an outdoor excursion into various objects. Discuss how clay is used in making pottery.

- ☐ Make a mural of a beach or a lake or an ocean. Discuss why people prefer sandy beaches for fun areas as opposed to other types of shores.
- ☐ Place the same number of earthworms, three or four, in each pail of soil planted with some bean seeds. After the beans have matured, take the soil apart and count the earthworms found in each pail. Examine the condition of both the earthworms and the soil.

Environmental Experience 2: Spooning for Soil

Take a walk at the school site. Prior to the outdoor experience, explain to the children that there may be several kinds of soils on the school ground. Encourage the children to look for different kinds of soil. Have the children examine the soil in the play area, under some shrubs, and the edge of the driveway or parking lot where the soil is thin and mixed with gravel. Have the children spoon up some of the soil and discover which soil is easier to dig up. Observe the distribution of plants on the school site. Have the children look for the areas on the school site that have the greatest diversity and most vigorous plant growth. Ask the children where might be the best place on the school site to plant, and once they decide where the best place is for plants to grow, ask them to spoon some soil in that area and compare it with the soils they previously examined.

Additional Activities

- ☐ Plant bean seeds either in soil samples taken into the classroom or in different locations on the school site, observing the results. Does this mean plants grow better in one kind of soil? Give reasons. A reminder: To determine which kind of soil is best for plants, be sure that the bean seeds in all soil samples receive the same kind of tending: equal water and equal sunlight.
- ☐ Create a mural style map of the school site, and on it have the children record their field work information as they do it.
- ☐ Have them illustrate the places where the plants grow, the difficulty digging by the slide, or by the parking lot, or by the other plants on the school site.

Materials

Teaspoons
Soil containers

Environmental Experience 3: The Magnificent Piece of Turf

Divide the children up into small teams (about five each) and prepare them for an outdoor experience. Explain that you are going to take a piece of the earth apart. When you get outdoors on the school site, have the groups sit around a plastic sheet and deposit a spade full of soil on the sheet. You can find a good piece of turf along a fence border or in a field. If you are not able to find turf near your school, you will have to haul it in.

Tell the children to dismantle the clump of soil and look at the many different kinds of things that are in the soil. As the children find earthworms, ants, or beetles, and prior to placing them in marked food jars, look for and discover their individual pathways and air passages in the clump of turf. Question the children on this concept. Any animal found should be deposited in a baby food jar, and *later released.*

Be sure the children notice the roots of the plants. Before shaking the dirt from the roots, have the children note how the roots are holding the soil together. (Introduce the concept that in some places and areas where there is little or no plant life, erosion occurs.) Have them try to shake the dirt off the roots and examine the whole plant.

As the clump of turf is dismantled have the children shake some of the dirt through a screen (or a sifter) to loosen more of the contents. They can begin to put their different "finds" and kinds of soil into piles of like things.

Have them observe the residue closely with hand lenses. They could list, describe, and/or record their finds. Soon they will be able to see that soil is more than dirt; it is a very complex, almost living thing, made of animals, plant residue, moisture, gravel, clay, and sand.

Ask the children to try to reconstruct the piece of turf. Try to refill the holes from which the dirt came. As they are working on this you can point out to them (if they have not already noticed) that to rebuild the turf exactly as it was is not possible.

The difficulty of reconstruction will stress the concept that often we are able to dismantle many things that we are not able to reassemble exactly as before. Ask the children to give examples (e.g., to crumble a cookie).

Additional Activities

- ☐ Illustrate a "make believe" city in the turf.
- ☐ Examine an artist's work of an earthworm's underground surrounding (a worm's-eye view).
- ☐ Have the children draw what it would be like if they lived in a magnificent piece of turf.
- ☐ Define "magnificent" as used in this title.
- ☐ Ask the children to explain why an artist might title a painting "magnificent."
- ☐ Plan with the children how the soil surrounding the school could become more alive. Suggest that they do some mulching and/or planting.
- ☐ Learn songs about animals.
- ☐ Make a display of animals that build their homes underground.

Materials

Five or more spadefuls of turf
Five plastic sheets
Screen (substitutes — sifter, sieve, hardware cloth)
Hand lenses
Baby food jars
Blank labels

Appendix

TEACHER BACKGROUND INFORMATION

Riddles

I am very free-flowing and
Not good for growing.
WHAT AM I? (sandy soil)

I am rich and dark and black
Each spring I help your flowers come back.
WHAT AM I? (rich garden soil)

Look at a rock and think of me
That's how hard my soil can be.
WHAT AM I? (clay)

By: Mrs. Rose Kundmueller, kindergarten teacher
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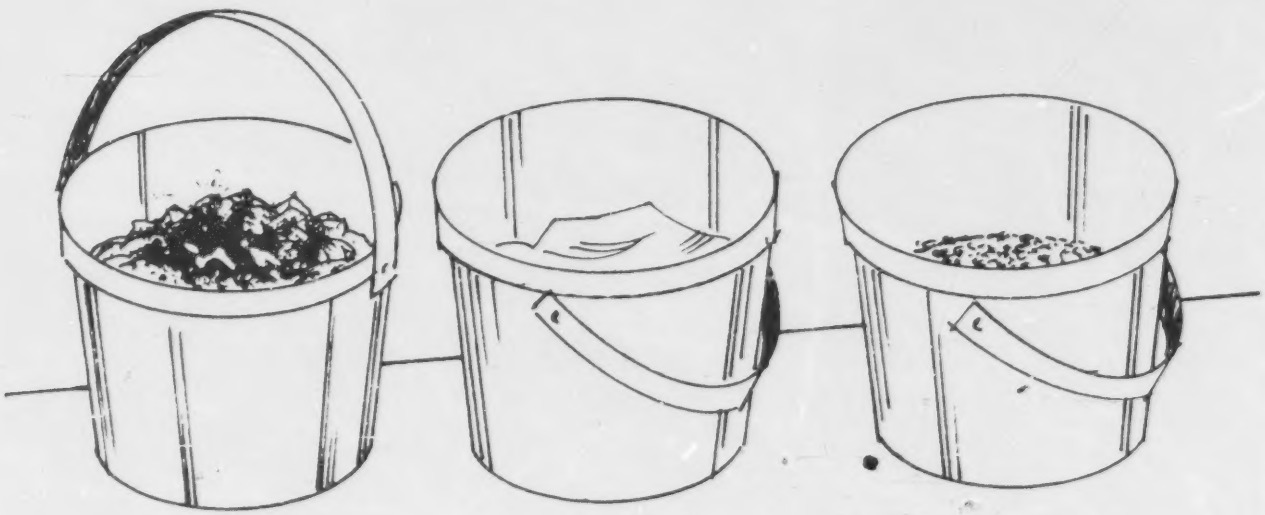

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Life in a Vacant Lot, 10 min., Color, B/W, Encyclopedia Britannica Educational Corp., Basic Life Science Program, 425 N. Michigan Ave., Chicago, Illinois 60611.

Nature in the City, 13 min., Color, Journal Films, 909 W. Diversey Parkway, Chicago, Illinois 60614.

Uncle Smiley and the Junkyard Playground, 13 min., Color, Learning Corporation of America, 711 Fifth Ave., New York, New York 10022.

Your Friend, The Soil, (Keep It or Lose It), 7 min., Color, Encyclopedia Britannica Educational Corp., 425 N. Michigan Ave., Chicago, Illinois 60611.

Kittens

This unit is entitled Kittens, but in reality it is about all pets and, in fact, could be adapted to use for all animals. With minor adjustments the technique of getting to know the kitten could be applied to any other animal. It could evolve into an animal of the month club.

You may find that to do all the activities during one visit by the kitten is quite a strain on the cat, the students, and the teacher. An alternative would be to have several short visits by the cat or have the cat stay several days for short span activities. If you're daring, keep the cat in class throughout the year.

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KITTENS

Unit Objectives:
Children will be able to describe the adaptations of pets and their needs.

Environmental Experience 1: Preparing for the Visit
Show a film about cats or other pets and prepare the room for an experience with pets; specifically a kitten.

Have the children discuss pets, what they are, and how we care for them. Ask the children to discuss their experiences with pets and to list the needs of all pets.

After a general discussion about pets, talk in more specific terms about cats and kittens. Tell the children a kitten is going to visit the class and ask them how they should prepare the classroom for the cat's visit.

Environmental Experience 2: Drinking
Bring a kitten to class. Have the children form a big circle, lying on their stomachs with the kitten in the middle. Give the kitten some milk in a saucer and have the children observe how the kitten laps its milk.

Have one of the children come forward and dip his fingers in the milk and have the cat lick the child's fingers. Ask the child to describe what the cat's tongue feels like. Allow as many children to let the cat lick their fingers as time or the cat's thirst allows.

Compare the cat's tongue with a human's tongue. Why can't we drink milk like a kitten? Have any of the children tried lapping milk from a saucer?

Additional Activities

- ☐ Discuss how other animals drink: elephants, fish, monkeys, hippopotamuses, birds, butterflies.
- ☐ Ask the class why cats like milk? Where do tiny kittens get milk? What other mammals drink milk from their mothers?

Environmental Experience 3: Food
Each of the following activities could be developed into separate lessons:

1. Put out some meat, vegetables, and fruit to see what type of food cats prefer.
2. Hang up pictures of the wild cousins of the kitten and discuss how they catch their food (prey). Why is the cat a good hunter?
3. Why do farms have lots of cats?
4. Watch how the kitten eats. Does it use its paws to help it eat? What does the cat do after it eats? Why would a cat clean itself after eating? (Clean fur *may* help the cat stalk its prey.)

Additional Activities

- ☐ Compare cat's teeth with dog's teeth.
- ☐ Start a skull collection (pictures or real skulls) to show tooth types.
- ☐ Talk about the kitten's wild cousins. Post some pictures of lions, tigers, leopards, and mountain lions. Discuss how people are trying to save the spotted cats (leopards and cheetahs) from being killed for their fur.

Environmental Experience 4: Paws
Hold the kitten up and show the children its feet. Slightly squeeze the kitten's foot until its claws are extended. Ask the children to discuss the retractable claws of cats. How does a cat use its claws?

Prepare a container of water color paint and dip the kitten's paw into the paint and make some footprints on white paper.

Why do cats have padded feet?

Additional Activities

- ☐ Put water color paint on all of the kitten's paws and let it walk on butcher paper to see how its tracks appear.
- ☐ Save the paw prints and enlarge to use as a model for potato prints, eraser prints, or repeat patterns. Make finger, hand, and foot prints of the children and the teacher.
- ☐ Find books with animal prints and compare them with the kitten's prints.
- ☐ Go outdoors and look for animal tracks in the mud and snow.
- ☐ Make plaster casts on prints from the mud.
- ☐ Discuss why people have claws (nails).

Environmental Experience 5: Purr
Quiet the kitten and children, then slowly stroke the kitten until it starts to purr. Ask the students to discuss the reason for the purr. Perhaps if they can't hear it purr they can feel it.

What other noises do cats make?

Discuss the possibilities of communication by cats through the use of sounds.

Additional Activities

- ☐ Observe non-sound forms of communication by the cat: ears back, tail twitch, crouch.
- ☐ Discuss how other animals communicate with and without sound.
- ☐ Do non-verbal dramatics, or try for an hour to talk using only "body language."
- ☐ Invent a sign language.
- ☐ Invent a spoken language.

Environmental Experience 6: Eyes
Darken the room. Observe how the cat's pupils open as the room gets darker. Shine a flashlight into the cat's eyes to observe the pupils dilating. Discuss the reasons cats hunt at night. How are the cat's eyes adapted to darkness?

Do people's eyes work the same way? Try the flashlight experiment with some of the children.

Compare the eyes of people and cats with the lens of a camera.

Do cat's eyes shine in the dark or reflect?

Additional Activities

- ☐ Bring in a camera with a lens that is readily observable and operate the opening and closing of the lens to compare it with an eye.
- ☐ Talk about eyelashes, brows and lids. Why do animals blink?
- ☐ Discuss how we care for our eyes.
- ☐ Find out if animals and people can communicate with their eyes.

Environmental Experience 7: Whiskers

Set up a small maze with assorted size openings, using books and boxes. Try to coax the kitten through the maze. Ask the children to observe how the cat uses its whiskers and what happens when the whiskers touch the sides of the maze. Ask the children to present their opinions about how a cat uses its whiskers. The success of this depends upon the cooperation of the cat. This is an experiment.

Additional Activities

- ☐ Discuss myths and legends about cats that the children have heard.
- ☐ At Halloween, talk about why cats are associated with witches, goblins, and things that go "bump" in the night.
- ☐ Read the poems "Tiger-Cat Tim" and "Cat" from the book *Poems to Grow On* (see appendix).
- ☐ Write poems about the kitten. Try haiku and cinquain types of poetry.
- ☐ Look for pictures of other animals with whiskers.
- ☐ Make cat masks, trying to depict as many of the facial features as possible.
- ☐ Invent a dance of the cats.

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Puss 'n Boots, 70 min., Color, Ideal Pictures, 512 Burlington Ave., La Grange, Illinois 60925.

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